THE AGE OF BIG BUSINESS

BY

BURTON J. HENDRICK

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VOLUME 39

THE CHRONICLES
OF AMERICA SERIES

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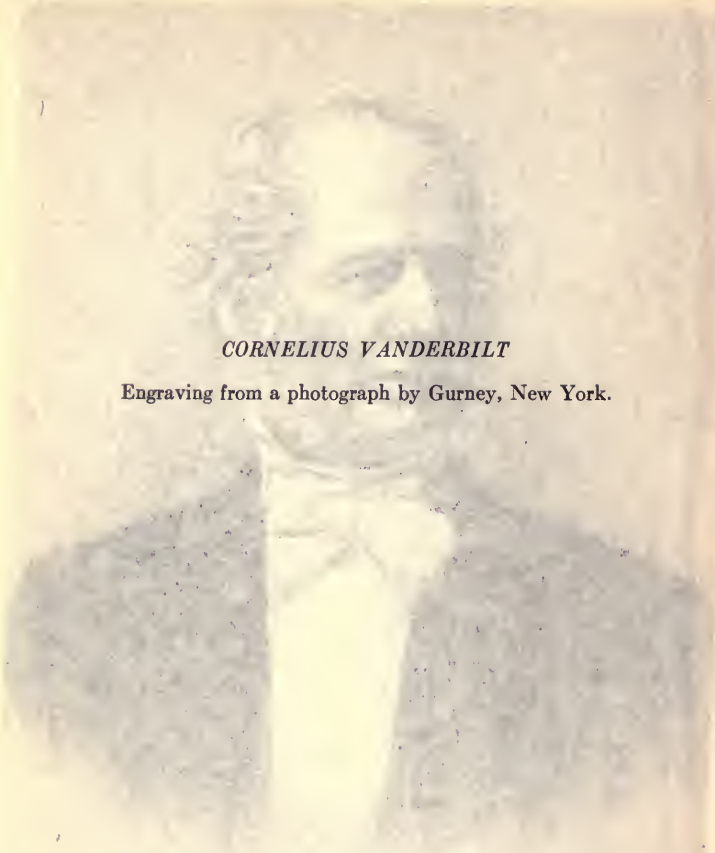

CORNELIUS VANDERBILT

Engraving from a photograph by Gurney, New York.

THE AGE OF BIG BUSINESS

A CHRONICLE OF THE CAPTAINS OF INDUSTRY

BY BURTON J. HENDRICK

NEW HAVEN: YALE UNIVERSITY PRESS
TORONTO: GLASGOW, BROOK & CO.
LONDON: HUMPHREY MILFORD
OXFORD UNIVERSITY PRESS

1920

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CONTENTS

I. INDUSTRIAL AMERICA AT THE END OF THE CIVIL WAR Page 1

II. THE FIRST GREAT AMERICAN TRUST " 25

III. THE EPIC OF STEEL " 58

IV. THE TELEPHONE: AMERICA'S MOST POETICAL ACHIEVEMENT " 86

V. THE DEVELOPMENT OF PUBLIC UTILITIES " 119

VI. MAKING THE WORLD'S AGRICULTURAL MACHINERY " 149

VII. THE DEMOCRATIZATION OF THE AUTOMOBILE " 170

BIBLIOGRAPHICAL NOTE " 189

INDEX " 191

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ILLUSTRATIONS

CORNELIUS VANDERBILT
Engraving from a photograph by Gurney, New York. *Frontispiece*

JOHN D. ROCKEFELLER
Painting by John S. Sargent. *Facing page 32*

ANDREW CARNEGIE
Photograph by Underwood & Underwood. " " *64*

ALEXANDER GRAHAM BELL
Photograph by Harris & Ewing, Washington. " " *96*

McCORMICK'S FIRST REAPING MACHINE.
Wood engraving in *Mechanic's Magazine and Register of Inventions and Improvements*, October, 1834.

CYRUS H. McCORMICK. Daguerreotype taken about 1839. " " *160*

THE AGE OF BIG BUSINESS

CHAPTER I

INDUSTRIAL AMERICA AT THE END OF THE CIVIL WAR

A COMPREHENSIVE survey of the United States, at the end of the Civil War, would reveal a state of society which bears little resemblance to that of today. Almost all those commonplace fundamentals of existence, the things that contribute to our bodily comfort while they vex us with economic and political problems, had not yet made their appearance. The America of Civil War days was a country without transcontinental railroads, without telephones, without European cables, or wireless stations, or automobiles, or electric lights, or sky-scrapers, or million-dollar hotels, or trolley cars, or a thousand other contrivances that today supply the conveniences and comforts of what we call our American civilization. The cities of that

period, with their unsewered and unpaved streets, their dingy, flickering gaslights, their ambling horse-cars, and their hideous slums, seemed appropriate settings for the unformed social life and the rough-and-ready political methods of American democracy. The railroads, with their fragile iron rails, their little wheezy locomotives, their wooden bridges, their unheated coaches, and their kerosene lamps, fairly typified the prevailing frontier business and economic organization. But only by talking with the business leaders of that time could we have understood the changes that have taken place in fifty years. For the most part we speak a business language which our fathers and grandfathers would not have comprehended. The word "trust" had not become a part of their vocabulary; "restraint of trade" was a phrase which only the antiquarian lawyer could have interpreted; "interlocking directorates," "holding companies," "subsidiaries," "underwriting syndicates," and "community of interest" — all this jargon of modern business would have signified nothing to our immediate ancestors. Our nation of 1865 was a nation of farmers, city artisans, and industrious, independent business men, and small-scale manufacturers. Millionaires, though they were not

unknown, did not swarm all over the land. Luxury, though it had made great progress in the latter years of the war, had not become the American standard of well-being. The industrial story of the United States in the last fifty years is the story of the most amazing economic transformation that the world has ever known; a change which is fitly typified in the evolution of the independent oil-driller of western Pennsylvania into the Standard Oil Company, and of the ancient open air forge on the banks of the Allegheny into the United States Steel Corporation.

The slow, unceasing ages had been accumulating a priceless inheritance for the American people. Nearly all of their natural resources, in 1865, were still lying fallow, and even undiscovered in many instances. Americans had begun, it is true, to exploit their more obvious, external wealth, their forests and their land; the first had made them one of the world's two greatest shipbuilding nations, while the second had furnished a large part of the resources that had enabled the Federal Government to fight what was, up to that time, the greatest war in history. But the extensive prairie plains whose settlement was to follow the railroad extensions of the sixties and the seventies — Kansas,

Nebraska, Iowa, Oklahoma, Minnesota, the Dakotas — had been only slightly penetrated. This region, with a rainfall not too abundant and not too scanty, with a cultivable soil extending from eight inches to twenty feet under the ground, with hardly a rock in its whole extent, with scarcely a tree, except where it bordered on the streams, has been pronounced by competent scientists the finest farming country to which man has ever set the plow. Our mineral wealth was likewise lying everywhere ready to the uses of the new generation. The United States now supplies the world with half its copper, but in 1865 it was importing a considerable part of its own supply. It was not till 1859 that the first "oil gusher" of western Pennsylvania opened up an entirely new source of wealth. Though we had the largest coal deposits known to geologists, we were bringing large supplies of this indispensable necessity from Nova Scotia. It has been said that coal and iron are the two mineral products that have chiefly affected modern civilization. Certainly the nations that have made the greatest progress industrially and commercially — England, Germany, America — are the three that possess these minerals in largest amount. From sixty to seventy per cent of all the known

coal deposits in the world were located in our national domain. Nature had given no other nation anything even remotely comparable to the four hundred and eighty square miles of anthracite in western Pennsylvania and West Virginia. Enormous fields of bituminous lay in those Appalachian ranges extending from Pennsylvania to Alabama, in Michigan, in the Rocky Mountains, and in the Pacific regions. In speaking of our iron it is necessary to use terms that are even more extravagant. From colonial times Americans had worked the iron ore plentifully scattered along the Atlantic coast, but the greatest field of all, that in Minnesota, had not been scratched. From the settlement of the country up to 1869 it had mined only 50,000,000 tons of iron ore; while up to 1910 we had produced 685,000,000 tons. The streams and waterfalls that, in the next sixty years, were to furnish the power that would light our cities, propel our street-cars, drive our transcontinental trains across the mountains, and perform numerous domestic services, were running their useless courses to the sea.

Industrial America is a product of the decades succeeding the Civil War; yet even in 1865 we were a large manufacturing nation. The leading

characteristic of our industries, as compared with present conditions, was that they were individualized. Nearly all had outgrown the household stage, the factory system had gained a foothold in nearly every line, even the corporation had made its appearance, yet small-scale production prevailed in practically every field. In the decade preceding the War, vans were still making regular trips through New England and the Middle States, leaving at farmhouses bundles of straw plait, which the members of the household fashioned into hats. The farmers' wives and daughters still supplemented the family income by working on goods for city dealers in ready-made clothing. We can still see in Massachusetts rural towns the little shoe shops in which the predecessors of the existing factory workers soled and heeled the shoes which shod our armies in the early days of the Civil War. Every city and town had its own slaughter house; New York had more than two hundred; what is now Fifth Avenue was frequently encumbered by large droves of cattle, and great stockyards occupied territory which is now used for beautiful clubs, railroad stations, hotels, and the highest class of retail establishments.

In this period before the Civil War compara-

tively small single owners, or frequently copartnerships, controlled practically every industrial field. Individual proprietors, not uncommonly powerful families which were almost feudal in character, owned the great cotton and woolen mills of New England. Separate proprietors, likewise, controlled the iron and steel factories of New York State and Pennsylvania. Indeed it was not until the War that corporations entered the iron industry, now regarded as the field above all others adapted to this kind of organization. The manufacture of sewing machines, firearms, and agricultural implements started on a great scale in the Civil War; still, the prevailing unit was the private owner or the partnership. In many manufacturing lines the joint stock company had become the prevailing organization, but even in these fields the element that so characterizes our own age, that of combination, was exerting practically no influence.

Competition was the order of the day: the industrial warfare of the sixties was a free-for-all. A mere reference to the status of manufactures in which the trust is now the all-prevailing fact will make the contrast clear. In 1865 thousands of independent companies were drilling oil in Pennsylvania and there were more than two hundred which

were refining the product. Nearly four hundred and fifty operators were mining coal, not even dimly foreseeing the day when their business would become a great railroad monopoly. The two hundred companies that were making mowers and reapers, seventy-five of them located in New York State, had formed no mental picture of the future International Harvester Company. One of our first large industrial combinations was that which in the early seventies absorbed the manufacturers of salt; yet the close of the Civil War found fifty competing companies making salt in the Saginaw Valley of Michigan. In the same State, about fifty distinct ownerships controlled the copper mines, while in Nevada the Comstock Lode had more than one hundred proprietors. The modern trust movement has now absorbed even our lumber and mineral lands, but in 1865 these rich resources were parceled out among a multiplicity of owners. No business has offered greater opportunities to the modern promoter of combinations than our street railways. In 1865 most of our large cities had their leisurely horse-car systems, yet practically every avenue had its independent line. New York had thirty separate companies engaged in the business of local transportation. Indeed the Civil War

period developed only one corporation that could be described as a "trust" in the modern sense. This was the Western Union Telegraph Company. Incredible as it may seem, more than fifty companies, ten years before the Civil War, were engaged in the business of transmitting telegraphic messages. These companies had built their telegraph lines precisely as the railroads had laid their tracks; that is, independent lines were constructed connecting two given points. It was inevitable, of course, that all these scattered lines should come under a single control, for the public convenience could not be served otherwise. This combination was effected a few years before the War, when the Western Union Telegraph Company, after a long and fierce contest, succeeded in absorbing all its competitors. Similar forces were bringing together certain continuous lines of railways, but the creation of huge trunk systems had not yet taken place. How far our industrial era is removed from that of fifty years ago is apparent when we recall that the proposed capitalization of $15,000,000, caused by the merging of the Boston and Worcester and the Western railroads, was widely denounced as "monstrous" and as a corrupting force that would destroy our Republican institutions.

Naturally this small-scale ownership was reflected in the distribution of wealth. The "swollen fortunes" of that period rested upon the same foundation that had given stability for centuries to the aristocracies of Europe. Social preëminence in large cities rested almost entirely upon the ownership of land. The Astors, the Goelets, the Rhinelanders, the Beekmans, the Brevoorts, and practically all the mighty families that ruled the old Knickerbocker aristocracy in New York were huge landed proprietors. Their fortunes thus had precisely the same foundation as that of the Prussian Junkers today. But their accumulations compared only faintly with the fortunes that are commonplace now. How many "millionaires" there were fifty years ago we do not precisely know. The only definite information we have is a pamphlet published in 1855 by Moses Yale Beach, proprietor of the *New York Sun*, on the "Wealthy Men of New York." This records the names of nineteen citizens who, in the estimation of well-qualified judges, possessed more than a million dollars each. The richest man in the list was William B. Astor, whose estate is estimated at $6,000,000. The next richest man was Stephen Whitney, also a large landowner, whose fortune is listed at

$5,000,000. Then comes James Lenox, again a landed proprietor, with $3,000,000. The man who was to accumulate the first monstrous American fortune, Cornelius Vanderbilt, is accredited with a paltry $1,500,000. Mr. Beach's little pamphlet sheds the utmost light upon the economic era preceding the Civil War. It really pictures an industrial organization that belongs as much to ancient history as the empire of the Cæsars. His study lists about one thousand of New York's "wealthy citizens." Yet the fact that a man qualified for entrance into this Valhalla who had $100,000 to his credit and that nine-tenths of those so chosen possessed only that amount shows the progress concentrated riches have made in sixty years. How many New Yorkers of today would look upon a man with $100,000 as "wealthy"?

The sources of these fortunes also show the economic changes our country has undergone. Today, when we think of our much exploited millionaires, the phrase "captains of industry" is the accepted description; in Mr. Beach's time the popular designation was "merchant prince." His catalogue contains no "oil magnates" or "steel kings" or "railroad manipulators"; nearly all the industrial giants of ante-bellum times — as

distinguished from the socially prominent whose wealth was inherited — had heaped together their accumulations in humdrum trade. Perhaps Peter Cooper, who had made a million dollars in the manufacture of isinglass and glue, and George Law, whose gains, equally large, represented fortunate speculations in street railroads, faintly suggest the approaching era; yet the fortunes which are really typical are those of William Aspinwall, who made $4,000,000 in the shipping business, of A. T. Stewart, whose $2,000,000 represented his earnings as a retail and wholesale dry goods merchant, and of Peter Harmony, whose $1,000,000 had been derived from happy trade ventures in Cuba and Spain. Many of the reservoirs of this ante-bellum wealth sound strangely in our modern ears. John Haggerty had made $1,000,000 as an auctioneer; William L. Coggeswell had made half as much as a wine importer; Japhet Bishop had rounded out an honest $600,000 from the profits of a hardware store; while Phineas T. Barnum ranks high in the list by virtue of $800,000 accumulated in a business which it is hardly necessary to specify. Indeed his name and that of the great landlords are almost the only ones in this list that have descended to posterity. Yet they were the

Rockefellers, the Carnegies, the Harrimans, the Fricks, and the Henry Fords of their day.

Before the Civil War had ended, however, the transformation of the United States from a nation of farmers and small-scale manufacturers to a highly organized industrial state had begun. Probably the most important single influence was the War itself. Those four years of bitter conflict illustrate, perhaps more graphically than any similar event in history, the power which military operations may exercise in stimulating all the productive forces of a people. In thickly settled nations, with few dormant resources and with practically no areas of unoccupied land, a long war usually produces industrial disorganization and financial exhaustion. The Napoleonic wars had this effect in Europe; in particular they caused a period of social and industrial distress in England. The few years immediately following Waterloo marked a period when starving mobs rioted in the streets of London, setting fire to the houses of the aristocracy and stoning the Prince Regent whenever he dared to show his head in public, when cotton spindles ceased to turn, when collieries closed down, when jails and workhouses were overflowing with a wretched proletariat, and when gaunt and

homeless women and children crowded the country highways. No such disorders followed the Civil War in this country, at least in the North and West. Spiritually the struggle accomplished much in awakening the nation to a consciousness of its great opportunities. The fact that we could spend more than a million dollars a day — expenditures that hardly seem startling in amount now, but which were almost unprecedented then — and that soon after hostilities ceased we rapidly paid off our large debt, directed the attention of foreign capitalists to our resources, and gave them the utmost confidence in this new investment field. Immigration, too, started after the war at a rate hitherto without parallel in our annals. The Germans who had come in the years preceding the Civil War had been largely political refugees and democratic idealists, but now, in much larger numbers, began the influx of north and south Germans whose dominating motive was economic. These Germans began to find their way to the farms of the Mississippi Valley; the Irish began once more to crowd our cities; the Slavs gravitated towards the mines of Pennsylvania; the Scandinavians settled whole counties of certain northwestern States; while the Jews began that conquest of the tailoring

industries that was ultimately to make them the clothiers of a hundred million people. For this industrial development, America supplied the land, the resources, and the business leaders, while Europe furnished the liquid capital and the laborers.

Even more directly did the War stimulate our industrial development. Perhaps the greatest effect was the way in which it changed our transportation system. The mere necessity of constantly transporting hundreds of thousands of troops and war supplies demanded reconstruction and reëquipment on an extensive scale. The American Civil War was the first great conflict in which railroads played a conspicuous military part, and their development during those four years naturally left them in a strong position to meet the new necessities of peace. One of the first effects of the War was to close the Mississippi River; consequently the products of the Western farms had to go east by railroad, and this fact led to that preëminence of the great trunk lines which they retain to this day. Almost overnight Chicago became the great Western shipping center, and though the river boats lingered for a time on the Ohio and the Mississippi they grew fewer year

by year. Prosperity, greater than the country had ever known, prevailed everywhere in the North throughout the last two years of the War.

So, too, feeding and supplying an army of millions of men laid the foundation of many of our greatest industries. The Northern soldiers in the early days of the war were clothed in garments so variegated that they sometimes had trouble in telling friend from foe, and not infrequently they shot at one another; so inadequately were our woolen mills prepared to supply their uniforms! But larger government contracts enabled the proprietors to reconstruct their mills, install modern machines, and build up an organization and a prosperous business that still endures. Making boots and shoes for Northern soldiers laid the foundation of America's great shoe industry. Machinery had already been applied to shoe manufacture, but only to a limited extent; under the pressure of war conditions, however, American inventive skill found ways of performing mechanically almost all the operations that had formerly been done by hand. The McKay sewing machine, one of the greatest of our inventions, which was perfected in the second year of the war, did as much perhaps as any single device to keep our soldiers

well shod and comfortable. The necessity of feeding these same armies created our great packing plants. Though McCormick had invented his reaper several years before the war, the new agricultural machinery had made no great headway. Without this machinery, however, our Western farmers could never have harvested the gigantic crops which not only fed our soldiers but laid the basis of our economic prosperity. Thus the War directly established one of the greatest, and certainly one of the most romantic, of our industries — that of agricultural machinery.

Above all, however, the victory at Appomattox threw upon the country more than a million unemployed men. Our European critics predicted that their return to civil life would produce dire social and political consequences. But these critics were thinking in terms of their own countries; they failed to consider that the United States had an immense unoccupied domain which was waiting for development. The men who fought the Civil War had demonstrated precisely the adventurous, hardy instincts which were most needed in this great enterprise. Even before the War ended, a great immigration started towards the mines and farms of the trans-Mississippi

country. There was probably no important town or district west of the Alleghanies that did not absorb a considerable number. In most instances, too, our ex-soldiers became leaders in these new communities. Perhaps this movement has its most typical and picturesque illustration in the extent to which the Northern soldiers opened up the oil-producing regions of western Pennsylvania. Venango County, where this great development started, boasted that it had more ex-soldiers than any similar section of the United States.

The Civil War period also forced into prominence a few men whose methods and whose achievements indicated, even though roughly and indistinctly, a new type of industrial leadership. Every period has its outstanding figure and, when the Civil War was approaching its end, one personality had emerged from the humdrum characters of the time — one man who, in energy, imagination, and genius, displayed the forces that were to create a new American world. Although this man employed his great talents in a field, that of railroad transportation, which lies outside the scope of the present volume, yet in this comprehensive view I may take Cornelius Vanderbilt as the symbol that links the old industrial era with the new. He is worthy of

more detailed study than he has ever received, for in personality and accomplishments Vanderbilt is the most romantic figure in the history of American finance. We must remember that Vanderbilt was born in 1794 and that at the time we are considering he was seventy-one years old. In the matter of years, therefore, his career apparently belongs to the ante-bellum days, yet the most remarkable fact about this remarkable man is that his real life work did not begin until he had passed his seventieth year. In 1865 Vanderbilt's fortune, consisting chiefly of a fleet of steamboats, amounted to about $10,000,000; he died twelve years later, in 1877, leaving $104,000,000, the first of those colossal American fortunes that were destined to astound the world. The mere fact that this fortune was the accumulated profit of only ten years shows perhaps more eloquently than any other circumstance that the United States had entered a new economic age. That new factor in the life of America and the world, the railroad, explains his achievement. Vanderbilt was one of the most astonishing characters in our history. His physical exterior made him perhaps the most imposing figure in New York. In his old age, at seventy-three, Vanderbilt married his second wife, a beautiful

Southern widow who had just turned her thirtieth year, and the appearance of the two, sitting side by side in one of the Commodore's smartest turnouts, driving recklessly behind a pair of the fastest trotters of the day, was a common sight in Central Park. Nor did Vanderbilt look incongruous in this brilliant setting. His tall and powerful frame was still erect, and his large, defiant head, ruddy cheeks, sparkling, deep-set black eyes, and snowy white hair and whiskers, made him look every inch the Commodore. These public appearances lent a pleasanter and more sentimental aspect to Vanderbilt's life than his intimates always perceived. For his manners were harsh and uncouth; he was totally without education and could write hardly half a dozen lines without outraging the spelling-book. Though he loved his race-horses, had a fondness for music, and could sit through long winter evenings while his young wife sang old Southern ballads, Vanderbilt's ungovernable temper had placed him on bad terms with nearly all his children — he had had thirteen, of whom eleven survived him — who contested his will and exposed all his eccentricities to public view on the ground that the man who created the New York Central system was actually insane. Vanderbilt's methods and his tem-

perament presented such a contrast to the commonplace minds which had previously dominated American business that this explanation of his career is perhaps not surprising. He saw things in their largest aspects and in his big transactions he seemed to act almost on impulse and intuition. He could never explain the mental processes by which he arrived at important decisions, though these decisions themselves were invariably sound. He seems to have had, as he himself frequently said, almost a seer-like faculty. He saw visions, and he believed in dreams and in signs. The greatest practical genius of his time was a frequent attendant at spiritualistic seances; he cultivated personally the society of mediums, and in sickness he usually resorted to mental healers, mesmerists, and clairvoyants. Before making investments or embarking in his great railroad ventures, Vanderbilt visited spiritualists; we have one circumstantial account of his summoning the wraith of Jim Fiske to advise him in stock operations. His excessive vanity led him to print his picture on all the Lake Shore bonds; he proposed to New York City the construction in Central Park of a large monument that would commemorate, side by side, the names of Vanderbilt and Washington; and he actually

erected a large statue to himself in his new Hudson River station in St. John's Park. His attitude towards the public was shown in his remark when one of his associates told him that "each and every one" of certain transactions which he had just forced through "is absolutely forbidden by the statutes of the State of New York." "My God, John!" said the Commodore, "you don't suppose you can run a railroad in accordance with the statutes of the State of New York, do you?" "Law!" he once roared on a similar occasion, "What do I care about law? Hain't I got the power?"

These things of course were the excrescences of an extremely vital, overflowing, imaginative, energetic human being; they are traits that not infrequently accompany genius. And the work which Vanderbilt did remains an essential part of our economic organization today. Before his time a trip to Chicago meant that the passenger changed trains seventeen times, and that all freight had to be unloaded at a similar number of places, carted across towns, and reloaded into other trains. The magnificent railroad highway that extends up the banks of the Hudson, through the Mohawk Valley, and alongside the borders of Lake Erie — a water line route nearly the entire distance — was all but

useless. It is true that not all the consolidation of these lines was Vanderbilt's work. In 1853 certain millionaires and politicians had linked together the several separate lines extending from Albany to Buffalo, but they had managed the new road so wretchedly that the largest stockholders in 1867 begged Vanderbilt to take over the control. By 1873 the Commodore had acquired the Hudson River, extending from New York to Albany, the New York Central extending from Albany to Buffalo, and the Lake Shore which ran from Buffalo to Chicago. In a few years these roads had been consolidated into a smoothly operating system. If, in transforming these discordant railroads into one, Vanderbilt bribed legislatures and corrupted courts, if he engaged in the largest stock-watering operations on record up to that time, and took advantage of inside information to make huge winnings on the stock exchange, he also ripped up the old iron rails and relaid them with steel, put down four tracks where formerly there had been two, replaced wooden bridges with steel, discarded the old locomotives for new and more powerful ones, built splendid new terminals, introduced economies in a hundred directions, cut down the hours required in a New York–Chicago trip from fifty to twenty-four, made

his highway an expeditious line for transporting freight, and transformed railroads that had formerly been the playthings of Wall Street and that frequently could not meet their pay-rolls into exceedingly profitable, high dividend paying properties. In this operation Vanderbilt typified the era that was dawning — an era of ruthlessness, of personal selfishness, of corruption, of disregard of private rights, of contempt for law and legislatures, and yet of vast and beneficial achievement. The men of this time may have traveled roughshod to their goal, but after all, they opened up, in an amazingly short time, a mighty continent to the uses of mankind. The triumph of the New York Central and Hudson River Railroad under Vanderbilt, a triumph which dazzled European investors as well as our own, and which represented an entirely different business organization from anything the nation had hitherto seen, appropriately ushered in the new business era whose outlines will be sketched in the succeeding pages.

CHAPTER II

THE FIRST GREAT AMERICAN TRUST

When Cornelius Vanderbilt died in 1877, America's first great industrial combination had become an established fact. In that year the Standard Oil Company of Ohio controlled at least ninety per cent of the business of refining and marketing petroleum. A new portent had appeared in our economic life, a phenomenon that was destined to affect not only the social and business existence of the every-day American but even his political and legal institutions.

It seems natural enough at the present time to refer to petroleum as an indispensable commodity. At the beginning of the Civil War, however, any such description would have been absurd. Though petroleum was not unknown, millions of American households were still burning candles, whale oil, and other illuminants. Not until 1859 did our ancestors realize that, concealed in the rocks of

western Pennsylvania, lay apparently inexhaustible quantities of a liquid which, when refined, would give a light exceeding in brilliancy anything they had hitherto known. The mere existence of petroleum, it is true, had been a familiar fact for centuries. Herodotus mentions the oil pits of Babylon, and Pliny informs us that this oil was actually used for lighting in certain parts of Sicily. It had never become an object of universal use, simply because no one had discovered how to obtain it in sufficient quantities. No one had suspected, indeed, that petroleum existed practically in the form of great subterranean rivers, lakes, or even seas. For ages this great natural treasure had been seeking to advertise its presence by occasionally seeping through the rocks and appearing on the surface of watercourses. It had been doing this all over the world — in China, in Russia, in Germany, in England, in our own country. Yet our obtuse ancestors had for centuries refused to take the hint. We can find much cause for self-congratulation in that it was apparently the American mind that first acted upon this obvious suggestion.

In Venango County, Pennsylvania, petroleum floated in such quantities on the surface of a branch of the Allegheny River that this small watercourse

had for generations been known as Oil Creek. The neighboring farmers used to collect the oil and use it to grease their wagon axles; others, more enterprising, made a business of gathering the floating substance, packing it in bottles, and selling it broadcast as a medicine. The most famous of these concoctions, "Seneca Oil," was widely advertised as a sure cure for rheumatism, and had an extensive sale in this country. "Kier's Rock Oil" afterwards had an even more extended use. Samuel M. Kier, who exploited this comprehensive cure-all, made no lasting contributions to medical science, but his method of obtaining his medicament led indirectly to the establishment of a great industry. In this western Pennsylvania region salt manufacture had been a thriving business for many years; the salt was obtained from salt water by means of artesian wells. This salt water usually came to the surface contaminated with that same evil-smelling oil which floated so constantly on top of the rivers and brooks. The salt makers spent much time and money "purifying" their water from this substance, never apparently suspecting that the really valuable product of their wells was not the salt water they so carefully preserved, but the petroleum which they threw away. Samuel M. Kier was

originally a salt manufacturer; more canny than his competitors, he sold the oil which came up with his water as a patent medicine. In order to give a mysterious virtue to this remedy, Kier printed on his labels the information that it had been "pumped up with salt water about four hundred feet below the earth's surface." His labels also contained the convincing picture of an artesian well — a rough woodcut which really laid the foundation of the Standard Oil Company.

In the late fifties Mr. George H. Bissell had become interested in rock oil, not as an embrocation and as a cure for most human ills, but as a light-giving material. A professor at Dartmouth had performed certain experiments with this substance which had sunk deeply into Bissell's imagination. So convinced was this young man that he could introduce petroleum commercially that he leased certain fields in western Pennsylvania and sent a specimen of the oil to Benjamin Silliman, Jr., Professor of Chemistry at Yale. Professor Silliman gave the product a more complete analysis than it had ever previously received and submitted a report which is still the great classic in the scientific literature of petroleum. This report informed Bissell that the substance could be refined cheaply and

easily, and that, when refined, it made a splendid illuminant, besides yielding certain by-products, such as paraffin and naphtha, which had a great commercial value. So far, Bissell's enterprise seemed to promise success, yet the great problem still remained: how could he obtain this rock oil in amounts large enough to make his enterprise a practical one? A chance glimpse of Kier's label, with its picture of an artesian well, supplied Bissell with his answer. He at once sent E. L. Drake into the oil-fields with a complete drilling equipment, to look, not for salt water, but for oil. Nothing seems quite so obvious today as drilling a well into the rock to discover oil, yet so strange was the idea in Drake's time that the people of Titusville, where he started work, regarded him as a lunatic and manifested a hostility to his enterprise that delayed operations for several months. Yet one day in August, 1859, the coveted liquid began flowing from "Drake's folly" at the rate of twenty-five barrels a day.

Because of this performance Drake has gone down to fame as the man who "discovered oil." In the sense that his operation made petroleum available to the uses of mankind, Drake was its discoverer, and his achievement seems really a

greater one than that of the men who first made apparent our beds of coal, iron, copper, or even gold. For Drake really uncovered an entirely new substance. And the country responded spontaneously to Drake's success. For anything approaching the sudden rush to the oil-fields we shall have to go to the discovery of gold in California ten years before. Men flocked into western Pennsylvania by the thousands; fortunes were made and lost almost instantaneously. Oil flowed so plentifully in this region that it frequently ran upon the ground, and the "gusher," which threw a stream of the precious liquid sometimes a hundred feet and more into the air, became an almost every-day occurrence. The discovery took the whole section by surprise; there were no towns, no railways, and no wagon roads except a few almost impassable lumber trails. Yet, almost in a twinkling, the whole situation changed; towns sprang up overnight, roads were built, over which teamsters could carry the oil to the nearest shipping points, and the great trunk lines began to extend branches into the regions. The one thing, next to Drake's well, that made the oil available, was the discovery, which was made by Samuel Van Syckel, that a two-inch pipe, starting at the well, could convey the oil for

several miles to the nearest railway station. In a few years the whole oil region of Venango County was an inextricable tangle of these primitive pipe lines.

Thus, before the Civil War had ended, the western Pennsylvania wilderness had been transformed into the busy headquarters of a new industry. Companies had been formed, many of them the wildest stock-jobbing operations, refineries had been started, in a few years the whalers of New England had almost lost their occupation, but millions of American homes, that had hitherto had to spend the long winter evenings almost in darkness, suddenly found themselves flooded with light. In Cleveland, in Pittsburgh, in Philadelphia, in New York, and in the oil regions, the business of refining and selling petroleum had reached extensive proportions. Europe, although it had great undeveloped oil-fields of its own, drew upon this new American enterprise to such an extent that, eleven years after Drake's "discovery," petroleum had taken fourth place among our exported articles.

The very year that Bissell had organized his petroleum company a boy of sixteen had obtained his first job in a produce commission office on a dock in Cleveland. As the curtain rises on the career of

John D. Rockefeller, we see him perched upon a high stool, adding up figures and casting accounts, faithfully doing every odd office job that came his way, earning his employer's respect for his industry, his sobriety, and his unmistakable talents for business. Nor does this picture inadequately visualize Rockefeller's whole after-life, and explain the business qualities that made possible his unexampled success. It is, indeed, the scene to which Mr. Rockefeller himself most frequently reverts when, in his famous autobiographical discourses to his Cleveland Sunday School, he calls our attention to the rules that inevitably lead to industrial prosperity. "Thrift, thrift, Horatio," is the one idea upon which the great captain of the oil business has always insisted. Many have detected in these habits of mind only the cheese-paring activities of a naturally narrow spirit. Rockefeller's old Cleveland associates remember him as the greatest bargainer they had ever known, as a man who had an eye for infinite details and an unquenchable patience and resource in making economies. Yet Rockefeller was clearly more than a pertinacious haggler over trifles. Certainly such a diagnosis does not explain a man who has built up one of the world's greatest organizations and accumulated

JOHN D. ROCKEFELLER

Painting by John S. Sargent.

the largest fortune which has ever been placed at the disposal of one man. Indeed, Rockefeller displayed unusual business ability even before he entered the oil business. A young man who, at the age of nineteen, could start a commission house and do a business of nearly five hundred thousand the first year must have had commercial capacity to an extraordinary degree.

Fate had placed Rockefeller in Cleveland in the days when the oil business had got well under way. In the early sixties a score or so of refineries had started in this town, many of which were making large profits. It is not surprising that Rockefeller, gazing at these black and evil-smelling buildings from the vantage point of his commission office, should have felt an impulse to join in the gamble. He plunged into this new activity at the age of twenty-three. He possessed two great advantages over most of his adventurous competitors; one was a heavy bank account, representing his earnings in the commission business, and the other a partner, Samuel Andrews, who was generally regarded as a mechanical genius in the production of illuminating oil. At the beginning, therefore, Rockefeller had the two essentials which largely explain his subsequent career; an adequate liquid capital and

high technical resources. In the first few years the Rockefeller houses — he rapidly organized three, one after another — competed with a large number of other units in the oil business on somewhat more than even terms. At this time Rockefeller was merely one of a large number of successful oil refiners, yet during these early days a grandiose scheme was taking shape in that quiet, insinuating, far-reaching brain. He said nothing about it, even to his closest associates, yet it filled his every waking hour. For this young man was taking a comprehensive sweep of the world and he saw millions of people, in the Americas, in Europe, and in Asia, whose need for the article in which he dealt would grow more insistent every day. He saw that he was handling a product which was becoming as much a necessity of life as the air itself. The young man reached out to grasp this business. "All of it," we can picture Rockefeller saying to himself, "all of it shall be mine." Any study of Rockefeller's career must lead to the conclusion that, before he had reached his thirtieth year, he had determined to monopolize this growing necessity. The mere fact that this young man could form such a stupendous plan indicates that in him we are meeting for the first time a new type

of industrial leader. At that time monopolies were unknown in the United States. That certain old English Kings had frequently granted exclusive trading privileges to favored merchants most educated Americans knew; and their knowledge of monopolies extended little further than this. Yet about 1868 John D. Rockefeller started consciously to revive this ancient practice, and to bring under one ownership the magnificent industry to which Drake's sensational discovery had given rise.

Daring as was this conception, the resourcefulness and the skill with which Rockefeller executed it were more startling still. Merely to catalogue, one by one, the achievements of the ten succeeding fruitful years, almost takes one's breath away. Indeed the whole operation proceeded with such a Napoleonic rapidity of action that the outside world had hardly grasped Rockefeller's intention before the monopoly had been made complete. We catch one glimpse of Rockefeller, in 1868, as head of the prosperous house of Rockefeller, Andrews, and Flagler, and eight years afterwards we see him once more, this time the man who controlled practically the entire petroleum business of the world. His career of conquest began in 1870, when the firm of Rockefeller, Andrews, and Flagler, joining hands

with several large capitalists in Cleveland and New York, was incorporated under the name of the Standard Oil Company of Ohio. In 1870 about twenty-five independent refineries, many of them prosperous and powerful, were manufacturing oil in the city of Cleveland; two years afterward this new Standard Oil Company had absorbed all of them except five. In these two critical years the oil business of the largest refining center in the United States had thus passed into Rockefeller's hands. By 1874 the greatest refineries in New York and Philadelphia had likewise merged their identity with his own. When Rockefeller began his acquisition, there were thirty independent refineries operating in Pittsburgh, all of which, in four or five years, passed one by one under his control. The largest refineries of Baltimore surrendered in 1875.

These capitulations left only one important refining headquarters in the United States which the Standard had not absorbed. This was that section of western Pennsylvania where the oil business had had its origin. The mere fact that this area was the headquarters of the oil supply gave it great advantages as a place for manufacturing the finished product. The oil regions regarded these advantages as giving them the right to dominate the

growing industry, and they had frequently proclaimed the doctrine that the business belonged to them. They hated Rockefeller as much as they feared him, yet at the very moment when the Titusville operators were hanging him in effigy and posting the hoardings with cabalistic signs against his corporation, this mysterious, almost uncanny power was encircling them. Men who one night were addressing public meetings denouncing the Standard influence would suddenly sell out their holdings the next day. In 1875 John D. Archbold, a brilliant young refiner who had grown up in the oil regions and who had gained much local fame as opponent of the Standard, appeared in Titusville as the President of the Acme Oil Company. At that time there were twenty-seven independent refineries in this section. Archbold began buying and leasing these establishments for his Acme Company, and in about four years practically every one had passed under his control. The Acme Company was merely a subsidiary of the Standard Oil.

These rapid purchasing campaigns gave the Standard ninety per cent of all the refineries in the United States, but Rockefeller's scheme comprehended more than the acquisition of refineries. In the main the Rockefeller group left the production

of crude oil in the hands of the private drillers, but practically every other branch of the business passed ultimately into their hands. Both the New York Central and the Erie railroads surrendered to the Standard the large oil terminal stations which they had maintained for years in New York. As a consequence, the Standard obtained complete supervision of all oil sent by railroad into New York, and it also secured the machinery of a complete espionage system over the business of competitors. The Standard acquired companies which had built up a large business in marketing oil. Even more dramatic was its success in gathering up, one after another, these pipe lines which represented the circulatory system of the oil industry. In the early days these pipe lines were small and comparatively simple affairs. They merely carried the crude oil from the wells to railroad centers; from these stations the railroads transported it to the refineries at Cleveland, New York, and other places. At an early day the construction and management of these pipe lines became a separate industry. And now, in 1873, the Standard Oil Company secured possession of a one-third interest in the largest of these privately owned companies, the American Transfer Company. Soon afterward the

United Pipe Line Company went under their control. In 1877 the Empire Transportation Company, a large pipe line and refining corporation which the Pennsylvania Railroad had controlled for many years, became a Standard subsidiary.

Meanwhile certain hardy spirits in the oil regions had conceived a much more ambitious plan. Why not build great underground mains directly from the oil regions to the seaboard, pump the crude oil directly to the city refineries, and thus free themselves from dependence on the railroads? At first the idea of pumping oil through pipes over the Alleghany Mountains seemed grotesque, but competent engineers gave their indorsement to the plan. A certain "Dr." Hostetter built for the Columbia Conduit Company a trunk pipe line that extended thirty miles from the oil regions to Pittsburgh. Hardly had Hostetter completed his splendid project when the Standard Oil capitalists quietly appeared and purchased it! For four years another group struggled with an even more ambitious scheme, the construction of a conduit, five hundred miles long, from the oil regions to Baltimore. The American people looked on admiringly at the splendid enterprise whose projectors, led by General Haupt, the builder of the Hoosac Tunnel, struggled

against bankruptcy, strikes, railroad opposition, and hostile legislatures, in their attempts to push their pipe line to the sea. In 1879 the Tidewater Company first began to pump their oil, and the American press hailed their achievement as something that ranked with the laying of the Atlantic Cable and the construction of the Brooklyn Bridge. But in less than two years the Rockefeller interest had entered into agreements with the Tidewater Company that practically placed this great seaboard pipe line in its hands.

Thus in less than ten years Rockefeller had realized his ambitious dream; he now controlled practically everything concerned in the manufacture and sale of petroleum. The change had come about so stealthily, so secretly, and even so remorselessly that it impressed the public almost as the work of some uncanny genius. What were the forces, personal and economic, that had produced this new phenomenon in our business life? In certain particulars the Standard Oil monopoly was the product of well-understood principles. From his earliest days John D. Rockefeller had struggled to eliminate the middleman. He established factories to build his own barrels, to make his own acids; he created his own selling firms, and, instead of paying

large storage charges, he constructed his own warehouses in New York. From his earliest days as a refiner, he had adopted the principle of paying no man a profit, and of performing all the intermediate acts that had formerly resulted in large tribute to middlemen. Moreover, the Standard Oil Company was apparently the first great American industrial enterprise that realized the necessity of operating with an abundant capital. Not the least of Mr. Rockefeller's achievements was his success in associating with the new company men having great financial standing — Amasa Stone, Benjamin Brewster, Oliver Jennings, and the like, capitalists whose banking resources, placed at the disposition of the Standard, gave it an immense advantage over its rivals. While his competitors were "kiting" checks and waiting, hat in hand, on the good nature of the money lenders, Rockefeller always had a large bank balance, upon which he could instantly draw for his operations.

Nor must we overlook the fact that the Standard group contained a large number of exceedingly able men. "They are mighty smart men," said the despairing W. H. Vanderbilt, in 1879, when pressed to give his reasons for granting rebates to the Rockefeller group. "I guess if you ever had to deal

with them you would find that out." In Rockefeller the corporation possessed a man of tireless industry and unshakable determination. Nothing could turn him aside from the work to which he had put his hand. Public criticism and even denunciation, while he resented it as unjust and regarded it as the product of a general misunderstanding, never caused the leader of Standard Oil even momentarily to flinch. He was a man of one idea, and he worked at it day and night, taking no rest or recreation, skillfully turning to his purpose every little advantage that came his way. His associates — men like Flagler, Archbold, and Rogers — also had unusual talents, and together they built up the splendid organization that still exists. They exacted from their subordinates the last ounce of attention and energy and they rewarded generously everybody who served them well. They showed great judgment in establishing refineries at the most strategic points and in giving up localities, such as Boston and Portland, which were too far removed from their supplies. They established a marketing system which enabled them to bring their oil directly from their own refineries to the retailer, all in their own tank cars and tank wagons. They extended their markets in foreign countries,

so that now the Standard sells the larger part of its products outside the United States. They established chemical research laboratories which devised new and inexpensive methods for refining the product and developed invaluable by-products, such as paraffin, naphtha, vaseline, and lubricating oils. It is impossible to study the career of the Standard Oil Company without concluding that we have here an example of a supreme business intelligence working in a field which gave the widest possible scope of action.

A high quality of organization, however, does not completely explain the growth of this monopoly. The Standard Oil Company was the beneficiary of methods that have deservedly received great public opprobrium. Of these the one that stands forth most conspicuously is the railroad rebate. Those who have attempted to trace the very origin of the Rockefeller preëminence to railroad discrimination have not entirely succeeded. Only the most hazy evidence exists that the firm of Rockefeller, Andrews, and Flagler greatly profited from rebates. In fact, refined oil was not transported from Cleveland to the seaboard by railroad until 1870, the year that this firm dissolved; practically all of the product then went by way of the Great Lakes and

the Erie Canal. Possibly the Rockefeller firm did get occasional rebates on crude oil from the oil regions to the refineries, but so did their competitors. It is therefore not likely that such favors had great influence in making this single firm the most successful in the largest refining center. With the organization of the Standard Oil Company, however, rebates became a more important consideration.

The turning-point in the history of the oil industry came when the Rockefeller interests acquired the Cleveland refineries. The details concerning this act of generalship are fairly well known. The South Improvement Company is a corporation that necessarily bulks large in the history of the Standard Oil. Mr. Rockefeller and his associates have always disclaimed the parentage of this organization. They assert — and their assertion is doubtless true — that the only responsible begetters were Thomas A. Scott, President of the Pennsylvania Railroad, and certain refineries in Pittsburgh and Philadelphia which, though they were afterwards absorbed by the Standard, were at that time their competitors. These refiners and the Pennsylvania, over which the Standard Oil then was making no shipments, thus represented a group,

composed of railroads and refiners, which was antagonistic to the Rockefeller interests. The South Improvement Company was an association of refiners with which the railroads, chiefly the Pennsylvania, the New York Central, and the Erie, made exclusive contracts for shipping oil. Under these contracts rates to the seaboard were to be generally raised, though the members of the South Improvement Company were to receive liberal rebates. The refiners of Cleveland and Pittsburgh were to get lower rates than the refiners located in the oil regions. But the clause in these contracts that caused the greatest amazement and indignation was one which gave the inside group rebates on every barrel of oil shipped by its competitors.

It would be difficult to imagine any transaction more wicked than these contracts. Carried into execution they inevitably meant the extinction of every refiner who had not been admitted into the inside ring. Of the two thousand shares of the South Improvement Company, the gentlemen who were at that time most conspicuously identified with the Standard Oil Company subscribed to five hundred and forty. Mr. Rockefeller has always protested that he did not favor the scheme and that

he became a party to it simply because he could not afford to antagonize the powerful Pennsylvania Railroad, which had originated it. When the details became public property, a wave of indignation swept from the Atlantic to the Pacific; the oil regions, which would have been the heaviest sufferers, shut down their wells and so cut off the supply of crude oil; the New York newspapers started a "crusade" against the South Improvement group and Congress ordered an investigation. So fiercely was the public wrath aroused that the railroads ran to cover, abrogated the contracts, signed an agreement promising never more to grant rebates to any one, while the Pennsylvania Legislature repealed the charter of the South Improvement Company. This particular scheme, therefore, never came to maturity.

Before the South Improvement Company ended its corporate existence, however, a great change had taken place in the oil situation. Practically all the refineries in Cleveland had passed into the control of the Standard Oil Company. The Standard has always denied that there was any connection between the purchase of these great refineries and the organization of the South Improvement Company. But there is much evidence sustaining a

contrary view, for many of these refiners afterward went on the witness stand and told circumstantial stories, all of which made precisely the same point. This was that the Standard men had come to them, shown the contracts which had been made by the South Improvement Company, and argued that, under these new conditions, the refineries left outside the combination could not long survive. The Standard's rivals were therefore urged to "come in," to take Standard stock in return for their refineries, or, if they preferred, to sell outright. Practically all saw the force in this argument and sold — in most cases taking cash.

The acquisition of these Cleveland refineries made inevitable the Rockefeller conquest of the oil industry. Up to that time the Standard had refined about fifteen hundred barrels a day, and now suddenly its capacity jumped to more than twelve thousand barrels. This one strategic move had made Rockefeller master of about one-third of all the oil business in the United States, and this fact explains the rapidity with which the other citadels fell. There is no evidence that the Standard exercised any pressure upon the great refineries in New York, Pittsburgh, and Philadelphia. Indeed these concerns manifested an eagerness to join. The

fact that, unlike the Cleveland refiners, many of the firms in these other cities took Standard stock, and so became parts of the new organization, is in itself significant. They evidently realized that they were casting their fortunes with the winning side. The huge shipments which the Standard now controlled explain this change in front. Every day Mr. Rockefeller could send from Cleveland to the seaboard a train, sixty cars long, loaded with the blue barrels containing his celebrated liquid. That was a consideration for which any railroad would at that time sell its soul. And the New York Central road promptly made this sacrifice. Hardly had the ink dried on its written promise not to grant any rebates when it began granting them to the Standard Oil Company.

In those days the railroad rate was not the sacred, immutable thing which it subsequently became, although the argument for equal treatment of shippers existed theoretically just as strongly forty years ago as it does today. The rebate was just as illegal then as it is at present; there was no precise statute, it is true, which made it unlawful until the Interstate Commerce Act was passed in 1887; but the common law had always prohibited such discriminations. In the seventies

and eighties, however, railroad men like Cornelius Vanderbilt and Thomas A. Scott were less interested in legal formalities than in getting freight. They regarded transportation as a commodity to be bought and sold, like so much sugar or wheat or coal, and they believed that the ordinary principles which regulated private bargaining should also regulate the sale of the article in which they dealt. According to this reasoning, which was utterly false and iniquitous, but generally prevalent at the time, the man who shipped the largest quantities of oil should get the lowest rate.

The purchase of the Cleveland refineries made the Standard Oil group the largest shippers and therefore they obtained the most advantageous terms for transporting their product. Under these conditions they naturally obtained the monopoly, the extent of which has been already described. Their competitors could rage, hold public meetings, start riots, threaten to lynch Mr. Rockefeller and all his associates, but they could not long survive in face of these advantages. The only way in which the smaller shippers could overcome this handicap was by acquiring new methods of transportation. It was this necessity that inspired the construction of pipe lines; but the Standard, as already de-

scribed, succeeded in absorbing these just about as rapidly as they were constructed.

Not only did the Standard obtain railroad rebates but it developed the most death-dealing methods in its system of marketing its oil. In these campaigns it certainly overstepped the boundaries of legitimate business, even according to the prevailing morals of its own or of any other time. While it probably did not set fire to rival refineries, as it has sometimes been accused of doing, it undoubtedly did resort to somewhat Prussian methods of destroying the foe. This great corporation divided the United States into several sections, over each of which it appointed an agent, who in turn subdivided his territory into smaller divisions, each one of which likewise had its captain. The order imperatively issued to each agent was, "Sell all the oil that is sold in your district." To these instructions he was rigidly held; success in accomplishing his task meant advancement and an increased salary, with a liberal pension in his old age, whereas failure meant a pitiless dismissal. He was expected to supervise not only his own business, but that of his rivals as well, to obtain access to their accounts, their shipments, and their customers. It has been asserted, and the assertion

has been supported by considerable evidence, that these agents did not hesitate to bribe railroad employees and in this way get access to their competitors' bills of lading and records of their shipments, and that they would even bribe dealers to cancel such orders and take the oil from them at a lower price. This information laid the foundation for those price-cutting campaigns that have brought the name of the Standard Oil into such disfavor. And when the Standard cut, it cut to kill; the only purpose was to drive the competitor from the field, and, when this had been accomplished, the price of oil would promptly go up again. The organization of "bogus companies," started purely for the purpose of eliminating competitors, seems to have been a not infrequent practice. This latter method emphasizes another quality that accompanied the Standard's operations and so largely explains its unpopularity — the secrecy with which it so commonly worked. Though the independent oil refiners were combating the most powerful financial power of the time, they were frequently fighting in the dark, never knowing where to deliver their blows.

This same characteristic was manifested in the form of corporate existence which the Standard

adopted. The first great "trust" was a trust not only in name but in fact. The Standard introduced not only a new economic development into our national organization; it introduced a new word into our language and an issue into American politics that provided sustenance for the presidential campaigns of twenty-five years. From the beginning the Standard Oil had always been a close corporation. Originally it had had only ten stockholders, and this number had gradually grown until, in 1881, there were forty-one. These men had adopted a new and secretive method of combining their increasing possessions into a single ownership. In 1873 the Standard Company had increased its capital stock (originally $1,000,000) to $3,500,000, the new certificates being exchanged for interests in the great New York and Philadelphia refineries. The Standard Oil Company of Ohio never had a larger capital stock than that. As additional properties were acquired, the interests were placed in the hands of trustees, who held them for the joint benefit of the stockholders in the original company. In 1882 this idea was carried further, for then the Standard Oil Trust was organized. The fact that the properties lay in so many different States, many of which had laws intended to curb corporations,

was evidently what led to this form of consolidation. A trust was formed, consisting of nine trustees, who held, for the benefit of the Standard Oil stockholders, all the stock in the Standard and in the subsidiary companies. Instead of certificates of stock the trustees issued certificates of trust amounting to $70,000,000. Each Standard stockholder received twenty of these certificates for each share which he held of Standard stock. These certificates could be bought and sold and passed on by inheritance precisely the same as stocks.

Ingenious as was this legal device, it did not stand the test of the courts. In 1892 the Ohio Supreme Court declared the Standard Oil Trust a violation of the law and demanded its dissolution. The persistent attempts of the Standard to disregard this order increased its reputation for lawlessness. Finally, in 1899, after Ohio had brought another action, the trust was dissolved. The Standard interests now reorganized all their holdings under the name of the Standard Oil Company of New Jersey. Again, in 1911, the United States Supreme Court declared this combination a violation of the Sherman Anti-Trust Act, and ordered its dissolution. By this time the Standard capitalists had learned the value of public opinion as a corpo-

rate asset, and made no attempt to evade the order of the court. The Standard Oil Company of New Jersey proceeded to apportion among its stockholders the stock which it held in thirty-seven other companies — refineries, pipe lines, producing companies, marketing companies, and the like. Chief Justice White, in rendering his decision, specifically ordered that, in dissolving their combination, the Standard should make no agreement, contractual or implied, which was intended still to retain their properties in one ownership. As less than a dozen men owned a majority interest in the Standard Oil Company of New Jersey, these same men naturally continued to own a majority interest in the subsidiary companies. Though the immediate effect of this famous decision therefore was not to cause a separation in fact, this does not signify that, as time goes on, such a real dissolution will not take place. It is not unlikely that, in a few years, the transfers of the stock by inheritance or sale will weaken the consolidated interest to a point where the companies that made up the Standard Company will be distinct and competitive.

This is more likely to be the case since, long before the decision of 1911, the Standard Oil Company had ceased to be a monopoly. In the early nine-

ties there came to the front in the oil regions a man whose organizing ability and indomitable will suggested the Standard Oil leaders themselves. This man's soul burned with an intense hatred of the Rockefeller group, and this sentiment, as much as his love of success, inspired all his efforts. There is nothing finer in American business history than the fifteen years' battle which Lewis Emery, Jr., fought against the greatest financial power of the day. In 1901 this long struggle met with complete success. Its monuments were the two great trunk pipe lines which Emery had built from the Pennsylvania regions to Marcus Hook, near Philadelphia, one for pumping refined and one for pumping crude. The Pure Oil Company, Emery's creation, has survived all its trials and has done an excellent business. And meanwhile other independents sprang up with the discovery of oil in other parts of the country. This discovery first astonished the Standard Oil men themselves; when someone suggested to Archbold, thirty-five years ago, that the mid-continent field probably contained large oil supplies, he laughed, and said that he would drink all the oil ever discovered outside of Pennsylvania. In these days a haunting fear pursued the oil men that the Pennsylvania field

would be exhausted and that their business would be ended. This fear, as developments showed, had a substantial basis; the Pennsylvania yield began to fail in the eighties and nineties, until now it is an inconsiderable element in this gigantic industry. Ohio, Indiana, Illinois, Kansas, Oklahoma, Texas, California, and other States in turn became the scene of the same exciting and adventurous events that had followed the discovery of oil in Pennsylvania. The Standard promptly extended its pipe lines into these new areas, but other great companies also took part in the development. These companies, such as the Gulf Refining Company and the Texas Refining Company, have their gathering pipe lines, their great trunk lines, their marketing stations, and their export trade, like the Standard; the Pure Oil Company has its tank cars, its tank ships, and its barges on the great rivers of Europe. The ending of the rebate system has stimulated the growth of independents, and the production of crude oil and the market demand in a thousand directions has increased the business to an extent which is now far beyond the ability of any one corporation to monopolize. The Standard interests refine perhaps something more than fifty per cent of the crude oil produced in this country.

But in recent years, Standard Oil has meant more than a corporation dealing in this natural product. It has become the synonym of a vast financial power reaching in all directions. The enormous profits made by the Rockefeller group have found investments in other fields. The Rockefellers became the owners of the great Mesaba iron ore range in Minnesota and of the Colorado Fuel and Iron Company, the chief competitor of United States Steel. It is the largest factor in several of the greatest American banks. Above all, it is the single largest railroad power in America today.

CHAPTER III

THE EPIC OF STEEL

It was the boast of a Roman Emperor that he had found the Eternal City brick and left it marble. Similarly the present generation of Americans inherited a country which was wood and have transformed it into steel. That which chiefly distinguishes the physical America of today from that of forty years ago is the extensive use of this metal. Our fathers used steel very little in railway transportation; rails and locomotives were usually made of iron, and wood was the prevailing material for railroad bridges. Steel cars, both for passengers and for freight, are now everywhere taking the place of the more flimsy substance. We travel today in steel subways, transact our business in steel buildings, and live in apartments and private houses which are made largely of steel. The steel automobile has long since supplanted the wooden carriage; the steel ship has displaced the iron

and wooden vessel. The American farmer now encloses his lands with steel wire, the Southern planter binds his cotton with steel ties, and modern America could never gather her abundant harvests without her mighty agricultural implements, all of which are made of steel. Thus it is steel that shelters us, that transports us, that feeds us, and that even clothes us.

This substance is such a commonplace element in our lives that we take it for granted, like air and water and the soil itself; yet the generation that fought the Civil War knew practically nothing of steel. They were familiar with this metal only as a curiosity or as a material used for the finer kinds of cutlery. How many Americans realize that steel was used even less in 1865 than aluminum is used today? Nearly all the men who have made the American Steel Age — such as Carnegie, Phipps, Frick, and Schwab — are still living and some of them are even now extremely active. Thirty-five years ago steel manufacture was regarded, even in this country, as an almost exclusively British industry. In 1870 the American steel maker was the parvenu of the trade. American railroads purchased their first steel rails in England, and the early American steel makers went to Sheffield for

their expert workmen. Yet, in little more than ten years, American mills were selling agricultural machinery in that same English town, American rails were displacing the English product in all parts of the world, American locomotives were drawing English trains on English railways, and American steel bridges were spanning the Ganges and the Nile. Indeed, the United States soon surpassed England. In the year before the World War the United Kingdom produced 7,500,000 tons of steel a year, while the United States produced 32,000,000 tons. Since the outbreak of the Great War, the United States has probably made more steel than all the rest of the world put together. "The nation that makes the cheapest steel," says Mr. Carnegie, "has the other nations at its feet." When some future Buckle analyzes the fundamental facts in the World War, he may possibly find that steel precipitated it and that steel determined its outcome.

Three circumstances contributed to the rise of this greatest of American industries: a new process for cheaply converting molten pig iron into steel, the discovery of enormous deposits of ore in several sections of the United States, and the entrance into the business of a hardy and adventurous group of

manufacturers and business men. Our steel industry is thus another triumph of American inventive skill, made possible by the richness of our mineral resources and the racial energy of our people. An elementary scientific discovery introduced the great steel age. Steel, of course, is merely iron which has been refined — freed from certain impurities, such as carbon, sulphur, and phosphorus. We refine our iron and turn it into steel precisely as we refine our sugar and petroleum. From the days of Tubal Cain the iron worker had known that heat would accomplish this purification; but heat, up to almost 1865, was an exceedingly expensive commodity. For ages iron workers had obtained the finer metal by applying this heat in the form of charcoal, never once realizing that unlimited quantities of another fuel existed on every hand. The man who first suggested that so commonplace a substance as air, blown upon molten pig iron, would produce the intensest heat and destroy its impurities, made possible our steel railroads, our steel ships, and our steel cities. When William Kelly, an owner of iron works near Eddyville, Kentucky, first proposed this method in 1847, he met with the ridicule which usually greets the pioneer inventor. When Henry Bessemer, several years

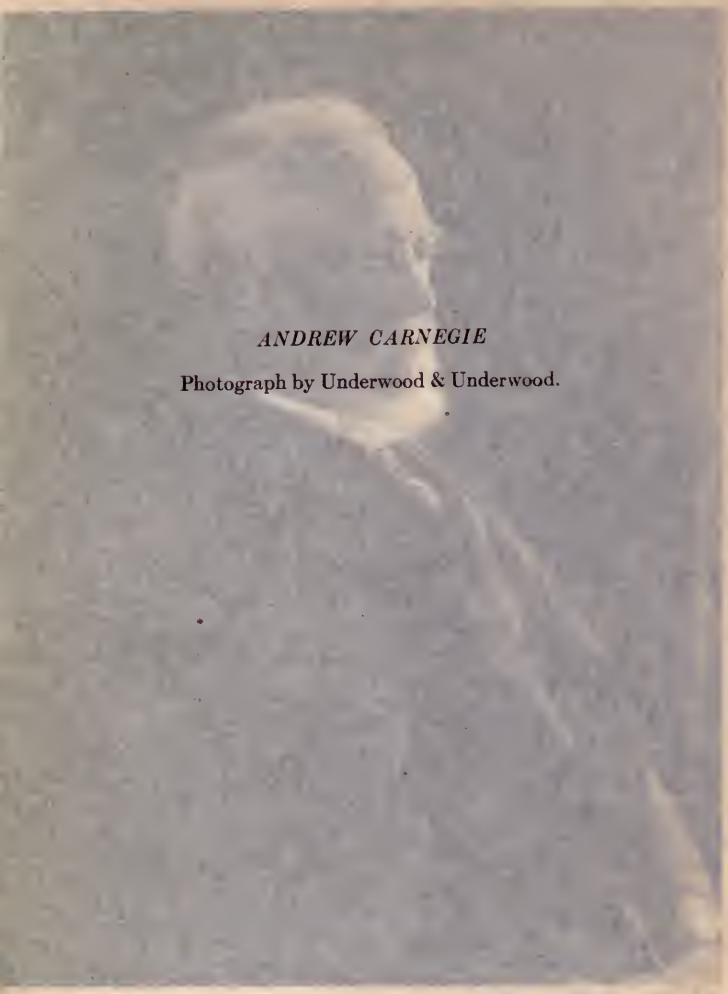
afterward, read a paper before the British Association for the Advancement of Science, in which he advocated the same principle, he was roared down as "a crazy Frenchman," and the savants were so humiliated by the suggestion that they voted to make no record of his "silly paper" in their official minutes. Yet these two men, the American Kelly and the Englishman Bessemer, were the creators of modern steel. The records of the American Patent Office clearly show that Kelly made "Bessemer" steel many years before Bessemer. In 1870 the American Government refused to extend Bessemer's patent in this country on the ground that William Kelly had a prior claim; in spite of this, Bessemer was undoubtedly the man who developed the mechanical details and gave the process a universal standing.

Though the Bessemer process made possible the production of steel by tons instead of by pounds, it would never in itself have given the nation its present prëeminence in the steel industry. Iron had been mined in the United States for two centuries on a small scale, the main deposits being located in the Lake Champlain region of New York and in western Pennsylvania. But these, and a hundred other places located along the Atlantic coast, could

not have produced ore in quantities sufficient to satisfy the yawning jaws of the Bessemer converters. As this new method poured out the liquid in thousands of tons, and as the commercial demand extended in a dozen different directions, the cry went up from the furnaces for more ore. And again Nature, which has favored America in so many directions, came to her assistance. Manufacturers in the steel regions began to recall strange stories which had been floating down for many years from the wilderness surrounding Lake Superior. The recollection of a famous voyage made in this region by Philo M. Everett, as far back as 1845, now laid siege to the imagination of the new generation of ironmasters. For years the Indians had told Everett of the "mountains of iron" that lay on the Minnesota shore of Lake Superior and had described their wonders in words that finally impelled this hardy adventurer to make a voyage of exploration. For six weeks, in company with two Indian guides, Everett had navigated a small boat along the shores of the Lake, covering a distance that now takes only a few hours. The Indians had long regarded this silent, red iron region with a superstitious reverence, and now, as the little party approached, they refused to complete the journey.

"Iron Mountain!" they said, pointing northward along the trail — "Indian not go near; white man go!" The sight which presently met Everett's eyes repaid him well for his solitary tramp in the forest. He found himself face to face with a "mountain a hundred and fifty feet high, of solid ore, which looked as bright as a bar of iron just broken." Other explorations subsequently laid open the whole of the Minnesota fields, including the Mesaba, which developed into the world's greatest iron range. America has other regions rich in ore, particularly in Alabama, located alongside the coal and limestone so necessary in steel production; yet it has drawn two-thirds of its whole supply from these Lake Superior fields. Not only the quantity, which is apparently limitless, but the quality explains America's leadership in steel making.

Mining in Minnesota has a character which is not duplicated elsewhere. When we think of an iron mine, we naturally picture subterranean caverns and galleries, and strange, gnome-like creatures prowling about with pick and shovel and drill. But mining in this section is a much simpler proceeding. The precious mineral does not lie concealed deep within the earth; it lies practically upon the surface. Removing it is not a question of blasting



ANDREW CARNEGIE

Photograph by Underwood & Underwood.

with dynamite; it is merely a matter of lifting it from the surface of the earth with a huge steam shovel. "Miners" in Minnesota have none of the conventional aspects of their trade. They operate precisely as did those who dug the Panama Canal. The railroad cars run closely to the gigantic red pit. A huge steam shovel opens its jaws, descends into an open amphitheater, licks up five tons at each mouthful, and, swinging sideways over the open cars, neatly deposits its booty. It is not surprising that ore can be produced at lower cost in the United States than even in those countries where the most wretched wages are paid. Evidently this one iron field, to say nothing of others already worked, gives a permanence to our steel industry.

Not only did America have the material resources; what is even more important, she had also the men. American industrial history presents few groups more brilliant, more resourceful, and more picturesque than that which, in the early seventies, started to turn these Minnesota ore fields into steel — and into gold. These men had all the dash, all the venturesomeness, all the speculative and even the gambling instinct, needed for one of the greatest industrial adventures in our annals. All had sprung from the simplest and humblest

origins. They had served their business apprenticeships as grocery clerks, errand boys, telegraph messengers, and newspaper gamins. For the most part they had spent their boyhood together, had played with each other as children, had attended the same Sunday schools, had sung in the same church choirs, and, as young men, had quarreled with each other over their sweethearts. The Pittsburgh group comprised about forty men, most of whom retired as millionaires, though their names for the most part signify little to the present-day American. Kloman, Coleman, McCandless, Shinn, Stewart, Jones, Vandervoort — are all important men in the history of American steel. Thomas A. Scott and J. Edgar Thompson, men associated chiefly with the creation of the Pennsylvania Railroad, also made their contributions. But three or four men towered so preëminently above their associates that today when we think of the human agencies that constructed this mighty edifice, the names that insistently come to mind are those of Carnegie, Phipps, Frick, and Schwab.

Books have been written to discredit Carnegie's work and to picture him as the man who has stolen success from the labor of greater men. Yet Carnegie is the one member of a brilliant company who had

the indispensable quality of genius. He had none of the plodding, painstaking qualities of a Rockefeller; he had the fire, the restlessness, the keen relish for adventure, and the imagination that leaped far in advance of his competitors which we find so conspicuous in the older Vanderbilt. Carnegie showed these qualities from his earliest days. Driven as a child from his Scottish home by hunger, never having gone to school after twelve, he found himself, at the age of thirteen, living in a miserable hut in Allegheny, earning a dollar and twenty cents a week as bobbin-boy in a cotton mill, while his mother augmented the family income by taking in washing. Half a dozen years later Thomas Scott, President of the Pennsylvania Railroad, made Carnegie his private secretary. How well the young man used his opportunities in this occupation appeared afterward when he turned his wide acquaintanceship among railroad men to practical use in the steel business. It was this personal adaptability, indeed, that explains Carnegie's success. In the narrow, methodical sense he was not a business man at all; he knew and cared nothing for its dull routine and its labyrinthine details. As a practical steel man his position is a negligible one. Though he was profoundly impressed by his first

sight of a Bessemer converter, he had little interest in the every-day process of making steel. He had also many personal weaknesses: his egotism was marked, he loved applause, he was always seeking opportunities for self-exploitation, and he even aspired to fame as an author and philosopher. The staid business men of Pittsburgh early regarded Carnegie with disfavor; his daring impressed them as rashness and his bold adventures as the plunging of the speculator. Yet in all its aspects Carnegie's triumph was a personal one. He was perhaps the greatest commercial traveler this country has ever known. While his more methodical associates plodded along making steel, Carnegie went out upon the highway, bringing in orders by the millions. He showed this same personal quality in the organization of his force. As a young man, entirely new to the steel industry, he selected as the first manager of his works Captain Bill Jones; his amazing judgment was justified when Jones developed into America's greatest practical genius in making steel. "Here lies the man" — Carnegie once suggested this line for his epitaph — "who knew how to get around him men who were cleverer than himself." Carnegie inspired these men with his own energy and restlessness; the spirit of the whole establishment

automatically became that of the pushing spirit of its head. This little giant became the most remorseless pace-maker in the steel regions. However astounding might be the results obtained by the Carnegie works the captain at the head was never satisfied. As each month's output surpassed that which had gone before, Carnegie always came back with the same cry of "More." "We broke all records for making steel last week!" a delighted superintendent once wired him and immediately he received his answer, "Congratulations. Why not do it every week?" This spirit explains the success of the Carnegie Company in outdistancing all its competitors and gaining a world-wide preëminence for the Pittsburgh district. But Carnegie did not make the mistake of capitalizing all this prosperity for himself; his real greatness as an American business man consists in the fact that he liberally shared the profits with his associates. Ruthless he might be in appropriating their last ounce of energy, yet he rewarded the successful men with golden partnerships. Nothing delighted Carnegie more than to see the man whom he had lifted from a puddler's furnace develop into a millionaire.

Henry Phipps, still living at the age of seventy-

eight, was the only one of Carnegie's early associates who remained with him to the end. Like many of the others, Phipps had been Carnegie's playmate as a boy, so far as any of them, in those early days, had opportunity to play; like all his contemporaries also, Phipps had been wretchedly poor, his earliest business opening having been as messenger boy for a jeweler. Phipps had none of the dash and sparkle of Carnegie. He was the plodder, the bookkeeper, the economizer, the man who had an eye for microscopic details. "What we most admired in young Phipps," a Pittsburgh banker once remarked, "is the way in which he could keep a check in the air for three or four days." His abilities consisted mainly in keeping the bankers complaisant, in smoothing the ruffled feelings of creditors, in cutting out unnecessary expenditures, and in shaving prices.

Carnegie's other two more celebrated associates, Henry C. Frick and Charles M. Schwab, were younger men. Frick was cold and masterful, as hard, unyielding, and effective as the steel that formed the staple of his existence. Schwab was enthusiastic, warm-hearted, and happy-go-lucky; a man who ruled his employees and obtained his results by appealing to their sympathies. The men

of the steel yards feared Frick as much as they loved "Charlie" Schwab. The earliest glimpses which we get of these remarkable men suggest certain permanent characteristics: Frick is pictured as the sober, industrious bookkeeper in his grandfather's distillery; Schwab as the rollicking, whistling driver of a stage between Loretto and Cresson. Frick came into the steel business as a matter of deliberate choice, whereas Schwab became associated with the Pittsburgh group more or less by accident.

The region of Connellsville contains almost 150 square miles underlaid with coal that has a particular heat value when submitted to the process known as coking. As early as the late eighties certain operators had discovered this fact and were coking this coal on a small scale. It is the highest tribute to Frick's intelligence that he alone foresaw the part which this Connellsville coal was to play in building up the Pittsburgh steel district. The panic of 1873, which laid low most of the Connellsville operators, proved Frick's opportunity. Though he was only twenty-four years old he succeeded, by his intelligence and earnestness, in borrowing money to purchase certain Connellsville mines, then much depreciated in price. From that

moment, coke became Frick's obsession, as steel had been Carnegie's. With his early profits he purchased more coal lands until, by 1889, he owned ten thousand coke ovens and was the undisputed "coke king" of Connellsville. Several years before this, Carnegie had made Frick one of his marshals, coke having become indispensable to the manufacture of steel, and in 1889 the former distiller's accountant became Carnegie's commander-in-chief. Probably the popular mind associates Frick chiefly with the importation of Slavs as workmen, with the terrible strikes that followed in consequence at Homestead, with the murderous attack made upon him by Berkman, the anarchist, and with his bitter, long-drawn-out quarrel with Andrew Carnegie. Frick's stormy career was naturally the product of his character.

On the other hand, temperamental pliability and lovableness were the directing traits of the man who, in his way, made contributions quite as solid to the extension of the Pittsburgh steel industry. Schwab worked with the human material quite as successfully as other men worked with iron ore, Bessemer furnaces, and coal. He handled successfully what was perhaps the greatest task in management ever presented to a manufacturer

when to him fell the job of reorganizing the Homestead Works after the strike of 1892 and of transforming thousands of riotous workmen into orderly and interested producers of steel. In three or four years practically every man on the premises had become "Charlie" Schwab's personal friend, and the Homestead property which, until the day he took charge, had been a colossal failure, had developed into one of the most profitable holdings of the Carnegie Company. As his reward Schwab, at the age of thirty-four, was made President of the Carnegie corporation. Only sixteen years before he had entered the steel works as a stake driver at a dollar a day.

When the Carnegie group began operations in the early seventies, American steel, as a British writer remarked, was a "hot-house product"; yet in 1900 the Carnegie partners divided $40,000,000 as the profits of a single year. They had demonstrated that the United States, despite the high prices that prevailed everywhere, could make steel more cheaply than any other country. Foreign observers have offered several explanations for this achievement. American makers had an endless supply of cheap and high-grade ore, cheaper coke, cheaper transportation, and workmen of a superior

skill. We must give due consideration to the fact that their organization was more flexible than those of older countries, and that it regulated promotion exclusively by merit and gave exceptional opportunities to young men. American steel makers also had scrap heaps whose size astounded the foreign observers; they never hesitated to discard the most expensive plants if by so doing they could reduce the cost of steel rails by a dollar a ton. Machinery for steel making had a more extensive development in this country than in England or Germany. Mr. Carnegie also enjoyed the advantages of a high protective tariff, though about 1900 he discovered that his extremely healthy infant no longer demanded this form of coddling. But probably the Carnegie Company's greatest achievement was the abolition of the middleman. In a few years it assembled all the essential elements of steel making in its own hands. Frick's entrance into the combination gave the concern an unlimited supply of the highest grade of coking coal. In a few years, the Carnegie interests had acquired great holdings in the Minnesota ore regions.

At first glance, the Pittsburgh region seems hardly the ideal place for the making of steel. Fortune first placed the industry there because all the

raw materials, especially iron ore and coal, seemed to exist in abundance. But the discovery of the Minnesota ore field, which alone could supply this essential product in the amounts which the furnaces demanded, immediately deprived the Pittsburgh region of its chief advantage. As a result of this sudden development, the manufacturers of Pittsburgh awoke one morning and discovered that their ore was located a thousand miles away. To bring it to their converters necessitated a long voyage by water and rail, with several reloadings. They overcame these obstacles by developing machinery for handling ore and by acquiring the raw materials and the connecting links of transportation. Ore which had been lying in the wilds of Minnesota on Monday morning was thus brought to Pittsburgh and made into steel rails or bridges or structural shapes by Saturday night. The Carnegie Company first acquired sufficient mineral lands to furnish ore for several generations and organized an ore fleet which transported the products of the mines through the lakes to ports on Lake Erie, particularly Ashtabula and Conneaut. The purchase of the Bessemer and Lake Erie Railroad, which extended from Conneaut to Pittsburgh, made this great transportation route complete. Besides

freeing their business from uncertainty, this elimination of middlemen naturally produced great economies.

Probably Andrew Carnegie's shrewdness in naming his first plant the J. Edgar Thompson Steel Works, after the powerful President of the Pennsylvania Railroad, and in making Thompson and his associate Scott partners, had much to do with his early success. These two gentlemen conferred two priceless favors upon the struggling enterprise. They became large purchasers of steel rails and their influence in this direction extended far beyond the Pennsylvania Railroad. What was perhaps even more important, they gave the Carnegie concerns railroad rebates. The use of rebates, as a method of stifling competition and building up a great industrial prosperity, is an offense which the popular mind associates almost exclusively with the Standard Oil Company, yet the Carnegie fortune, as well as that of John D. Rockefeller, received an artificial stimulation of this kind.

Though incomparably the greatest of the American steel companies, the Carnegie Steel Company by no means monopolized the field. In forty years, indeed, an enormous steel area had grown up, including western Pennsylvania, Ohio, Indiana, and

Illinois, practically all of it drawing its raw materials from those same teeming ore lands in the Lake Superior region. Johnstown, Youngstown, Cleveland, Lorain, Chicago, and Joliet, became headquarters of steel production almost as important as Pittsburgh itself. Two entirely new steel kingdoms, each with its own natural reservoirs of ore, grew up in Colorado and Alabama. The Colorado Fuel and Iron Company, which possessed apparently inexhaustible mineral lands in Colorado, Wyoming, Utah, New Mexico, and California, itself produces not far from three million tons a year, almost half the present production of Great Britain. The Alabama steel country has developed in even more spectacular fashion. Birmingham, a hive of southern industry placed almost as if by magic in the leisurely cotton lands of the South, had no existence in 1870, when the Pittsburgh prosperity began. In the Civil War, the present site of a city with a population of 140,000 was merely a blacksmith shop in the fork of the roads. Yet this district has advantages for the manufacture of steel that have no parallel elsewhere. The steel companies which are located here do not have to bring their materials laboriously from a distance but possess, immediately at hand, apparently endless store of the

three things needful for making steel — iron ore, coal, and limestone. All these territories have their personal romances and their heroes, many of them quite as picturesque as those of the Pittsburgh group.

It is doubtful indeed if American industry presents any figure quite as astonishing and variegated as that of John W. Gates, the man who educated farmers all over the world to the use of wire fencing. Half charlatan, half enthusiast, speculator, gambler, a man who created great enterprises and who also destroyed them, at times an up-building force and at other times a sinister influence, Gates completely typified a period in American history that, along with much that was heroic and splendid, had much also that was grotesque and sordid. The opera-bouffe performance that laid the foundations of Gates's great industry was in every way characteristic of this period. In 1871 Gates, then a clerk in a hardware store at twenty-five dollars a week, made his first attempt to sell barbed wire in the great cattle countries of the southwestern States. When the cattle men in Texas first saw this barbed wire, they ridiculed the idea that it could ever hold their steers. Gates selected a plaza in San Antonio, fenced it in with his new product, and invited the

enemies to bring along their wildest specimens. About thirty of Texas' most ferocious cattle, placed within the enclosure, spent a whole afternoon plunging at the barbs in a useless and tormenting attempt to escape. This spectacular demonstration of efficiency launched Gates fairly upon his career. He immediately began to sell his new fencing on an enormous scale; in a few years the whole world was demanding it, and it has become, as recent events have disclosed, a particularly formidable munition of war. The American Steel and Wire Company, one of the greatest of American corporations, was the ultimate outgrowth of that lively afternoon in San Antonio.

In 1900 the Carnegie Steel Company was making one-quarter of all the Bessemer steel produced in the United States. It owned in abundance all the properties which were essential to its completed output — coal, limestone, steel ships, railroads, and steel mills. In twenty-five years, from 1875 to 1900, this manufacturing enterprise had paid the Carnegie group profits aggregating $133,000,000, profits which, in the closing years of the century, had increased at a stupendous rate. In 1898 Carnegie and his associates had divided $11,500,000, in 1899 their earnings had grown to $25,000,000, and

in 1900 the aggregate had suddenly jumped to $40,000,000. Of this latter sum Carnegie received $25,000,000, Phipps $5,500,000, Frick $2,600,000, and Schwab $1,300,000. And Carnegie's little group could see no limit to the growth of their business and the expansion of their personal fortunes. Yet at that very moment Carnegie was planning to play the part of a Charles V. with the large empire which he had pieced together — to abdicate his throne, retire from business life, and spend his remaining days in quiet.

Many influences were impelling him to this decision. His triumph, stupendous as it had been, also had had its alloy of sorrow. Indeed this little Scotsman, now at the crowning of his glory, was one of the loneliest figures in the world. Practically all the forty men with whom he had been closely associated had vanished from the scene. He had quarreled with his playmate and lifelong partner, Henry Phipps, and was in the worst possible business and personal relations with Frick. He had no son to carry on his work. He had become greatly interested in his philanthropies, and he had declared that the man who died rich died disgraced. Moreover, new influences were rising in the steel trade with which Carnegie had little

sympathy. Its national capital seemed to be shifting from Pittsburgh to Wall Street. New men who knew nothing about steel but who possessed an intimate acquaintance with stocks and bonds — J. Pierpont Morgan, George W. Perkins, and their associates — were branching out as controllers of large steel interests. Carnegie had no interest in Wall Street; he has declared that he never speculated in his life and that he would immediately dissociate himself from any partner who would do so. This Wall Street coterie, in the years from 1898 to 1900, had made several large combinations in the steel trade. That was the era when the trust mania had gained possession of the American mind and when its worst features displayed themselves. The Federal Steel Company, the American Bridge Company, the American Steel and Wire, the National Tube Company, all representing the assembling of large works which had been engaged as rivals in similar enterprises, were launched, with the usual accompaniments of "underwriting syndicates," watered stock, and Wall Street speculation. This sort of thing made no appeal to Andrew Carnegie. His huge enterprise had always remained essentially a copartnership, and he had frequently expressed his abhorrence of trusts.

Yet, in spite of his wish to retire from business and in spite of his avowed intention to die poor, Carnegie now adopted the policy of the Sibylline leaves to all prospective purchasers. Moore and Reid would have purchased his interest for $157,000,000; when Rockefeller came along the price had risen to $250,000,000; when the oil man shook his head and retired, Carnegie immediately raised his price to $500,000,000. It is doubtful whether he would have sold at all had not his Wall Street competitors begun to encroach on a field which the little Scotsman understood quite as well as they — the production and merchandising of steel. The newly organized combinations were completing elaborate plans to go after Carnegie's business. Then Carnegie, who had practically retired from active life, again arrayed himself in his shirt-sleeves, abandoned his career of authorship, and resumed his early trade. His first attacks produced an immense reverberation in the House of Morgan. He purchased a huge tract at Conneaut and began building a gigantic plant for the manufacture of steel tubes, a business in which he had not hitherto engaged. This was a blow aimed at one of Morgan's pet new creations, the National Tube Company. Should Carnegie finish his works, there

was no doubt the Morgan enterprise would be ruined, for the new plant would be far more modern and so could manufacture the product at a much lower price; and, with Charles M. Schwab as active manager, what possible chance would the older corporation have? But Carnegie struck his enemy at an even more vulnerable point. The Pennsylvania Railroad had a practical monopoly of traffic in and out of Pittsburgh, and Pittsburgh "created" more freight business than any other city in the world. Carnegie lent his powerful support to George J. Gould, who was then extending his railroad system into the preëmpted field and was also making surveys and had financed a company to build an entirely new railroad from Pittsburgh to the Atlantic Coast. As Carnegie himself controlled the larger part of the freight that made Pittsburgh such an essential feeder to railroads, his new enterprise caused the greatest alarm. At the same time Carnegie equipped a new and splendid fleet of ore ships, his purpose being to enter a field of transportation which John D. Rockefeller had found extremely profitable.

Such were the circumstances and such were the motives that gave birth to the world's largest corporation. All one night, so the story goes, Charles

M. Schwab and John W. Gates discussed the steel situation with J. Pierpont Morgan. There was only one possible solution, they said — Andrew Carnegie must be bought out. By the time the morning sun came through the windows Morgan had been convinced. "Go and ask him what he will sell for," he said to Schwab. In a brief period Schwab came back to Morgan with a letter which contained the following figures — five per cent gold bonds $303,450,000; preferred stock $98,277,100; common stock $90,279,000 — a total of over $492,000,000. Carnegie demanded no cash; he preferred to hold a huge first mortgage on a business whose golden opportunities he knew so well. Morgan, who had been accustomed all his life to dictate to other men, had now met a man who was able to dictate to him. And he capitulated. The man who fifty-three years before had started life in a new country as a bobbin-boy at a dollar and twenty cents a week, now at the age of sixty-six retired from business the second richest man in the world. With him retired a miscellaneous assortment of millionaires whose fortunes he had made and whose subsequent careers in the United States and in Europe have given a peculiar significance to the name "Pittsburgh Millionaires." The United

States Steel Corporation, the combination that included not only the Carnegie Company but seventy per cent of all the steel concerns in the country, was really a trust made up of trusts. It had a capitalization of a billion and a half, of which about $700,000,000 was composed of the commodity usually known as "water"; but so greatly has its business grown and so capably has it been managed that all this liquid material has since been converted into more solid substance. The disappearance of Andrew Carnegie and his coworkers and the emergence of this gigantic enterprise completed the great business cycle in the steel trade. The age of individual enterprise and competition had passed — that of corporate control had arrived.

CHAPTER IV

THE TELEPHONE: "AMERICA'S MOST POETICAL ACHIEVEMENT"

A DISTINGUISHED English journalist, who was visiting the United States, in 1917, on an important governmental mission, had an almost sublime illustration of the extent to which the telephone had developed on the North American Continent. Sitting at a desk in a large office building in New York, Lord Northcliffe took up two telephone receivers and placed one at each ear. In the first he heard the surf beating at Coney Island, New York, and in the other he heard, with equal distinctness, the breakers pounding the beach at the Golden Gate, San Francisco. Certainly this demonstration justified the statement made a few years before by another English traveler. "What startles and frightens the backward European in the United States," said Mr. Arnold Bennett, "is the efficiency and fearful universality of the telephone.

To me it was the proudest achievement and the most poetical achievement of the American people."

Lord Northcliffe's experience had a certain dramatic justice which probably even he did not appreciate. He is the proprietor of the London *Times*, a newspaper which, when the telephone was first introduced, denounced it as the "latest American humbug" and declared that it "was far inferior to the well-established system of speaking tubes." The London *Times* delivered this solemn judgment in 1877. A year before, at the Philadelphia Centennial Exposition, Don Pedro, Emperor of Brazil, picked up, almost accidentally, a queer cone-shaped instrument and put it to his ear. "My God! It talks!" was his exclamation; an incident which, when widely published in the press, first informed the American people that another of the greatest inventions of all times had had its birth on their own soil. Yet the initial judgment of the American people did not differ essentially from the opinion which had been more coarsely expressed by the leading English newspaper. Our fathers did not denounce the telephone as an "American humbug," but they did describe it as a curious electric "toy" and ridiculed the notion that

it could ever have any practical value. Even after Alexander Graham Bell and his associates had completely demonstrated its usefulness, the Western Union Telegraph Company refused to purchase all their patent rights for $100,000! Only forty years have passed since the telephone made such an inauspicious beginning. It remains now, as it was then, essentially an American achievement. Other nations have their telephone systems, but it is only in the United States that its possibilities have been even faintly realized. It is not until Americans visit foreign countries that they understand that, imperfect as in certain directions their industrial and social organization may be, in this respect at least their nation is preëminent.

The United States contains nearly all the telephones in existence, to be exact, about seventy-five per cent. We have about ten million telephones, while Canada, Central America, South America, Great Britain, Europe, Asia, and Africa all combined have only about four million. In order to make an impressive showing, however, we need not include the backward peoples, for a comparison with the most enlightened nations emphasizes the same point. Thus New York City has more telephones than six European countries taken together

— Austria-Hungary, Belgium, Norway, Denmark, Italy, and the Netherlands. Chicago, with a population of 2,000,000, has more telephones than the whole of France, with a population of 40,000,000. Philadelphia, with 1,500,000, has more than the Russian Empire, with 166,000,000. Boston has more telephones than Austria-Hungary, Los Angeles more than the Netherlands, and Kansas City more than Belgium. Several office buildings and hotels in New York City have more instruments than the kingdoms of Greece or Bulgaria. The whole of Great Britain and Ireland has about 650,000 telephones, which is only about 200,000 more than the city of New York.

Mere numbers, however, tell only half the story. It is when we compare service that American superiority stands most manifest. The London newspapers are constantly filled with letters abusing the English telephone system. If these communications describe things accurately, there is apparently no telephone vexation that the Englishman does not have to endure. Delays in getting connections are apparently chronic. At times it seems impossible to get connections at all, especially from four to five in the afternoon — when the operators are taking tea. Suburban

connections, which in New York take about ninety seconds, average half an hour in London, and many of the smaller cities have no night service. An American thinks nothing of putting in a telephone; he notifies his company and in a few days the instrument is installed. We take a thing like this for granted. But there are places where a mere telephone subscription, the privilege of having an instrument installed, is a property right of considerable value and where the telephone service has a "waiting list," like an exclusive club. In Japan one can sell a telephone privilege at a good price, its value being daily quoted on the Stock Exchange. Americans, by constantly using the telephone, have developed what may be called a sixth sense, which enables them to project their personalities over an almost unlimited area. In the United States the telephone has become the one all-prevailing method of communication. The European writes or telegraphs while the American more frequently telephones. In this country the telephone penetrates to places which even the mails never reach. The rural free delivery and other forms of the mail service extend to 58,000 communities, while our 10,000,000 telephones encompass 70,000. We use this instrument for all the

varied experiences of life, domestic, social, and commercial. There are residences in New York City that have private branch exchanges, like a bank or a newspaper office. Hostesses are more and more falling into the habit of telephoning invitations for dinner and other diversions. Many people find telephone conversations more convenient than personal interviews, and it is every day displacing the stenographer and the traveling salesman.

Perhaps the most noteworthy achievement of the telephone is its transformation of country life. In Europe, rural telephones are almost unknown, while in the United States one-third of all our telephone stations are in country districts. The farmer no longer depends upon the mails; like the city man, he telephones. This instrument is thus the greatest civilizing force we have, for civilization is very largely a matter of intercommunication. Indeed, the telephone and other similar agencies, such as the parcel post, the rural free delivery, better roads, and the automobile, are rapidly transforming rural life in this country. In several regions, especially in the Mississippi Valley, a farmer who has no telephone is in a class by himself, like one who has no mowing-machine. Thus the latest returns from Iowa, taken by the census as

far back as 1907, showed that seventy-three per cent of all the farms — 160,000 out of 220,000 — had telephones and the proportion is unquestionably greater now. Every other farmhouse from the Atlantic to the Pacific contains at least one instrument. These statistics clearly show that the telephone has removed half the terrors and isolation of rural life. Many a lonely farmer's wife or daughter, on the approach of a suspicious-looking character, has rushed to the telephone and called up the neighbors, so that now tramps notoriously avoid houses that shelter the protecting wires. In remote sections, insanity, especially among women, is frequently the result of loneliness, a calamity which the telephone is doing much to mitigate.

In the United States today there is one telephone to every nine persons. This achievement represents American invention, genius, industrial organization, and business enterprise at their best. The story of American business contains many chapters and episodes which Americans would willingly forget. But the American Telephone and Telegraph Company represents an industry which has made not a single "swollen fortune," whose largest stockholder is the wife of Alexander Graham Bell, the inventor (a woman who, being totally deaf,

has never talked over the telephone); which has not corrupted legislatures or courts; which has steadily decreased the prices of its products as business and profits have increased; which has never issued watered stock or declared fictitious dividends; and which has always manifested a high sense of responsibility in its dealings with the public.

Two forces, American science and American business capacity, have accomplished this result. As a mechanism, this American telephone system is the product not of one but of many minds. What most strikes the imagination is the story of Alexander Graham Bell, yet other names — Carty, Scribner, Pupin — play a large part in the story.

The man who discovered that an electric current had the power of transmitting sound over a copper wire knew very little about electricity. Had he known more about this agency and less about acoustics, Bell once said himself, he would never have invented the telephone. His father and grandfather had been teachers of the deaf and dumb and had made important researches in acoustics. Alexander Graham Bell, born in Edinburgh in March, 1847, and educated there and in London, followed the ancestral example. This experience

gave Bell an expert knowledge of phonetics that laid the foundation for his life work. His invention, indeed, is clearly associated with his attempts to make the deaf and dumb talk. He was driven to America by ill-health, coming first to Canada, and in 1871 he settled in Boston, where he accepted a position in Boston University to introduce his system of teaching deaf-mutes. He opened a school of "Vocal Physiology," and his success in his chosen field brought him into association with the people who afterward played an important part in the development of the telephone. Not a single element of romance was lacking in Bell's experience; his great invention even involved the love story of his life. Two influential citizens of Boston, Thomas Sanders and Gardiner G. Hubbard, had daughters who were deaf and dumb, and both engaged Bell's services as teacher. Bell lived in Sanders's home for a considerable period, dividing his time between teaching his little pupil how to talk and puttering away at a proposed invention which he called a "harmonic telegraph." Both Sanders and Hubbard had become greatly interested in this contrivance and backed Bell financially while he worked. It was Bell's idea that, by a system of tuning different telegraphic receivers

to different pitches, several telegraphic messages could be sent simultaneously over the same wire. The idea was not original with Bell, although he supposed that it was and was entirely unaware that, at the particular moment when he started work, about twenty other inventors were struggling with the same problem. It was one of these other twenty experimenters, Elisha Gray, who ultimately perfected this instrument. Bell's researches have an interest only in that they taught him much about sound transmission and other kindred subjects and so paved the way for his great conception.

One day Hubbard and Sanders learned that Bell had abandoned his "harmonic telegraph" and was experimenting with an entirely new idea. This was the possibility of transmitting the human voice over an electric wire. While working in Sanders's basement, Bell had obtained from a doctor a dead man's ear, and it is said that while he was minutely studying and analyzing this gruesome object, the idea of the telephone first burst upon his mind. For years Bell had been engaged in a task that seemed hopeless to most men — that of making deaf-mutes talk. "If I can make a deaf-mute talk, I can make iron talk," he declared. "If I could make a current of electricity vary in intensity as

the air varies in density," he said at another time, "I could transmit sound telegraphically." Many others, of course, had dreamed of inventing such an instrument. The story of the telephone concerns many men who preceded Bell, one of whom, Philip Reis, produced, in 1861, a mechanism that could send a few discordant sounds, though not the human voice, over an electric wire. Reis seemed to have based his work upon an article published in *The American Journal of Science* by Dr. C. G. Page, of Salem, Mass., in 1837, in which he called attention to the sound given out by an electric magnet when the circuit is opened or closed. The work of these experimenters involves too many technicalities for discussion in this place. The important facts are that they all involved different principles from those worked out by Bell and that none of them ever attained any practical importance. Reis, in particular, never grasped the essential principles that ultimately made the telephone a reality. His work occupies a place in telephone history only because certain financial interests, many years after his death, brought it to light in an attempt to discredit Bell's claim to priority as the inventor. An investigator who seems to have grasped more clearly the basic idea was the distinguished

ALEXANDER GRAHAM BELL

Photograph by Harris & Ewing, Washington.

American inventor Elisha Gray, already mentioned as the man who had succeeded in perfecting the "harmonic telegraph." On February 14, 1876, Gray filed a caveat in the United States Patent Office, setting forth pretty accurately the conception of the electric telephone. The tragedy in Gray's work consists in the fact that, two hours before his caveat had been put in, Bell had filed his application for a patent on the completed instrument.

The champions of Bell and Gray may dispute the question of priority to their heart's content; the historic fact is that the telephone dates from a dramatic moment in the year 1876. Sanders and Hubbard, much annoyed that Bell had abandoned his harmonic telegraph for so visionary an idea as a long distance talking machine, refused to finance him further unless he returned to his original quest. Disappointed and disconsolate, Bell and his assistant, Thomas A. Watson, had started work on the top floor of the Williams Manufacturing Company's shop in Boston. And now another chance happening turned Bell back once more to the telephone. His magnetized telegraph wire stretched from one room to another located in a remote part of the building. One day Watson accidentally plucked a

piece of clock wire that lay near this telegraph wire, and Bell, working in another room, heard the twang. A few seconds later Watson was startled when an excited and somewhat disheveled figure burst into his room. "What was that?" shouted Bell. What had happened was clearly manifest; a sound had been sent distinctly over an electric wire. Bell's harmonic telegraph immediately went into the discard, and the young inventor — Bell was then only twenty-nine — became a man of one passionate idea. Yet final success did not come easily; the inventor worked day and night for forty weeks before he had obtained satisfactory results. It was on March 10, 1876, that Watson, in a distant room, picked up the first telephone receiver and heard these words, the first that had ever passed over a magnetized wire, "Come here, Watson; I want you." The speaking instrument had become a reality, and the foundation of the telephone, in all its present development, had been laid. When the New York and San Francisco line was opened in January, 1915, Alexander Graham Bell spoke these same words to his old associate, Thomas Watson, located in San Francisco, both men using the same instruments that had served so well on that historic occasion forty years before.

Though Bell's first invention comprehended the great basic idea that made it a success, the instrument itself bore few external resemblances to that which has become so commonplace today. If one could transport himself back to this early period and undergo the torture of using this primitive telephone, he would appreciate somewhat the labor, the patience, the inventive skill, and the business organization that have produced the modern telephone. In the first place you would have no separate transmitter and receiver. You would talk into a funnel-shaped contrivance and then place it against your ear to get the returning message. In order to make yourself heard, you would have to shout like a Gloucester sea-captain at the height of a storm. More than the speakers' voices would come over the wire. It seemed to have become the playground of a million devils; moanings, shriekings, mutterings, and noises of all kinds would constantly interrupt the flow of speech. To call up your "party" you would not merely lift the receiver as today; you would tap with a lead pencil, or some other appliance, upon the diaphragm of your transmitter. There were no separate telephone wires. The talking at first was done over the telegraph lines. The earliest "centrals"

reminded most persons of madhouses, for the day of the polite, soft-spoken telephone girl had not arrived. Instead, boys were rushing around with the ends of wires which they were frantically attempting to peg into the holes of the primitive switchboard and so establish "connections." When not knocking down and fighting each other, these boys were swearing into transmitters at the customers; and it is said that the incurable profanity of these early "telephone boys" had much to do with their supersession by girls. In the early days of the telephone, each instrument had to carry its own battery, usually installed in a little box under the transmitter. The early telephone wires, even in the largest cities, were strung on poles, as they are in country and suburban districts today. In places like New York and Chicago, these thousands of overhanging wires not only destroyed the attractiveness of the thoroughfare, but constantly interfered with the fire department and proved to be public nuisances in other ways. A telephone wire, however, loses much of its transmitting power when placed under ground, and it took many years of experimenting before the engineers perfected these subways. In these early days, of course, the telephone was purely a local matter. Certain visionary

enthusiasts had foreseen the possibility of a national, long distance system, but a large amount of labor, both in the laboratory and out, was to be expended before these aspirations could become realities.

The transformation of this rudimentary means of communication into the beautiful mechanism which we have today forms a splendid chapter in the history of American invention. Of all the details in Bell's apparatus the receiver is almost the only one that remains now what it was forty years ago. The story of the transmitter in itself would fill a volume. Edison's success in devising a transmitter which permitted talk in ordinary conversational tones — an invention that became the property of the Western Union Telegraph Company, which early embarked in the telephone business — at one time seemed likely to force the Bell Company out of business. But Emile Berliner and Francis Blake finally came to the rescue with an excellent instrument, and the suggestion of an English clergyman, the Reverend Henry Hummings, that carbon granules be used on the diaphragm, made possible the present perfect instrument. The magneto call bell — still used in certain backward districts — for many years gave fair

results for calling purposes, but the automatic switch, which enables us to get central by merely picking up the receiver, has made possible our great urban service. It was several years before the telephone makers developed so essential a thing as a satisfactory wire. Silver, which gave excellent results, was obviously too costly, and copper, the other metal which had many desirable qualities, was too soft. Thomas B. Doolittle solved this problem by inventing a hard-drawn copper wire. A young man of twenty-two, John J. Carty, suggested a simple device for exorcising the hundreds of "mysterious noises" that had made the use of the telephone so agonizing. It was caused, Carty pointed out, by the circumstance that the telephone, like the telegraph, used a ground circuit for the return wire; the resultant scrapings and moanings and howlings were merely the multitudinous voices of mother earth herself. Mr. Carty began installing the metallic circuit in his lines — that is, he used wire, instead of the ground, to complete the circuit. As a result of this improvement the telephone was immediately cleared of these annoying interruptions. Mr. Carty, who is now Chief Engineer of the American Telephone and Telegraph Company, and the man who has super-

intended all its extensions in recent years, is one of the three or four men who have done most to create the present system. Another is Charles E. Scribner, who, by his invention of that intricate device, the multiple switchboard, has converted the telephone exchange into a smoothly working, orderly place. Scribner's multiple switchboard dates from about 1890. It was Mr. Scribner also who replaced the individual system of dry cells with one common battery located at the central exchange, an improvement which saved the Company 4,000,000 dry cells a year. Then Barrett discovered a method of twisting fifty pairs of wires — since grown to 2400 pairs — into a cable, wrapping them in paper and molding them in lead, and the wires were now taken from poles and placed in conduits underground.

But perhaps the most romantic figure in telephone history, next to Bell, is that of a humble Servian immigrant who came to this country as a boy and obtained his first employment as a rubber in a Turkish bath. Michael I. Pupin was graduated from Columbia, studied afterward in Germany, and became absorbed in the new subject of electromechanics. In particular he became interested in a telephone problem that had bothered the greatest

experts for years. One thing that had prevented the great extension of the telephone, especially for long distance work, was the size of the wire. Long distance lines up to 1900 demanded wire about one-eighth of an inch thick — as thick as a fair-sized lead pencil; and, for this reason, the New York–Chicago line, built in 1893, consumed 870,000 pounds of copper wire of this size. Naturally the enormous expense stood in the way of any extended development. The same thickness also interfered with cable extension. Only about a hundred wires could be squeezed into one cable, against the eighteen hundred now compressed in the same area. Because of these shortcomings, telephone progress, about 1900, was marking time, awaiting the arrival of a thin wire that would do the work of a thick one. The importance of the problem is shown by the fact that one-fourth of all the capital invested in the telephone has been spent in copper. Professor Pupin, who had been a member of the faculty of Columbia University since 1888, solved this problem in his quiet laboratory and, by doing so, won the greatest prize in modern telephone art. His researches resulted in the famous "Pupin coil" by the expedient now known as "loading." When the scientists attempt to explain this invention,

they have to use all kinds of mathematical formulas and curves and, in fact, they usually get to quarreling among themselves over the points involved. What Professor Pupin has apparently done is to free the wire from those miscellaneous disturbances known as "induction." This Pupin invention involved another improvement unsuspected by the inventor, which shows us the telephone in all its mystery and beauty and even its sublimity. Soon after the Pupin coil was introduced, it was discovered that, by crossing the wires of two circuits at regular intervals, another unexplainable circuit was induced. Because this third circuit travels apparently without wires, in some manner which the scientists have not yet discovered, it is appropriately known as the phantom circuit. The practical result is that it is now possible to send three telephone messages and eight telegraph messages over two pairs of wires — all at the same time. Professor Pupin's invention has resulted in economies that amount to millions of dollars, and has made possible long distance lines to practically every part of the United States.

Thus many great inventive minds have produced the physical telephone. We can point to several men — Bell, Blake, Carty, Scribner, Barrett, Pupin

— and say of each one, "Without his work the present telephone system could not exist." But business genius, as well as mechanical genius, explains this achievement. For the first four or five years of its existence, the new invention had hard sailing. Bell and Thomas Watson, in order to fortify their finances, were forced to travel around the country, giving a kind of vaudeville entertainment. Bell made a speech explaining the new invention, while a cornet player, located in another part of the town, played solos, the music reaching the audience through several telephone instruments placed against the walls. Watson, also located at a distance, varied the program by singing songs via telephone. These lecture tours not only gave Bell the money which he sorely needed but advertised the innovation. There followed a few scattering attempts to introduce the telephone into every-day use and telephone exchanges were established in New York, Boston, Bridgeport, and New Haven. But these pioneers had the hostility of the most powerful corporation of the day — the Western Union Telegraph Company — and they lacked aggressive leaders.

In 1878, Mr. Gardiner Hubbard, Bell's earliest backer, and now his father-in-law, became

acquainted with a young man who was then serving in Washington as General Superintendent of the Railway Mail Service. This young man was Theodore N. Vail. His energy and enterprise so impressed Hubbard that he immediately asked Vail to become General Manager of the company which he was then forming to exploit the telephone. Viewed from the retrospection of forty years this offer certainly looks like one of the greatest prizes in American business. What it signified at that time, however, is apparent from the fact that the office paid a salary of $3500 a year and that for the first ten years Vail did not succeed in collecting a dollar of this princely remuneration. Yet it was a happy fortune, not only for the Bell Company but for the nation, that placed Vail at the head of this struggling enterprise. There was a certain appropriateness in his selection, even then. His granduncle, Stephen Vail, had built the engines for the first steamship to cross the Atlantic. A cousin had worked with Morse while he was inventing the telegraph. Vail, who was born in Carroll County, Ohio, in 1845, after spending two years as a medical student, suddenly shifted his plans and became a telegraph operator. Then he entered the Railway Mail service; in this service he completely revolutionized

the system and introduced reforms that exist at the present time. A natural bent had apparently directed Vail's mind towards methods of communication, a fact that may perhaps explain the youthful enthusiasm with which he took up the new venture and the vision with which he foresaw and planned its future. For the chief fact about Vail is that he was a business man with an imagination. The crazy little machine which he now undertook to exploit did not interest him as a means of collecting tolls, floating stock, and paying dividends. He saw in it a new method of spreading American civilization and of contributing to the happiness and comfort of millions of people. Indeed Vail had hardly seen the telephone when a picture portraying the development which we are familiar with today unfolded before his eyes. That the telephone has had a greater development in America than elsewhere and that the United States has avoided all those mistakes of organization that have so greatly hampered its growth in other lands, is owing to the fact that Vail, when he first took charge, mapped out the comprehensive policies which have guided his corporation since.

Vail early adopted the "slogan" which has directed the Bell activities for forty years — "One

System! One Policy! Universal Service." In his mind a telephone company was not a city affair, or even a state affair; it was a national affair. His aim has been from the first a universal, national service, all under one head, and reaching every hamlet, every business house, factory, and home in the nation. The idea that any man, anywhere, should be able to take down a receiver and talk to any one, anywhere else in the United States, was the conception which guided Vail's labors from the first. He did not believe that a mass of unrelated companies could give a satisfactory service; if circumstances had ever made a national monopoly, that monopoly was certainly the telephone. Having in view this national, universal, articulating monopoly, Vail insisted on his second great principle, the standardization of equipment. Every man's telephone must be precisely like every other man's, and that must be the best which mechanical skill and inventive genius could produce. To make this a reality and to secure perfect supervision and upkeep, it was necessary that telephones should not be sold but leased. By enforcing these ideas Vail saved the United States from the chaos which exists in certain other countries, such as France, where each subscriber purchases his own instrument,

making his selection from about forty different varieties. That certain dangers were inherent in this universal system Vail understood. Monopoly all too likely brings in excessive charges, poor service, and inside speculation; but it was Vail's plan to justify his system by its works. To this end he established a great engineering department which should study all imaginable mechanical improvements, with the results which have been described. He gave the greatest attention to every detail of the service and particularly insisted on the fairest and most courteous treatment of the public. The "please" which invariably accompanies the telephone girl's request for a number — the familiar "number, please" — is a trifle, but it epitomizes the whole spirit which Vail inspired throughout his entire organization. Though there are plenty of people who think that the existing telephone charges are too high, the fact remains that the rate has steadily declined with the extension of the business. Vail has also kept his company clear from the financial scandals that have disgraced so many other great corporations. He has never received any reward himself except his salary, such fortune as he possesses being the result of personal business ventures in South America

during the twenty years from 1887 to 1907 that he was not associated with the Bell interests.

Vail's first achievement was to rescue this invention from the greatest calamity which would have befallen it. The Western Union Telegraph Company, which in the early days had looked upon the telephone as negligible, suddenly awoke one morning to a realization of its importance. This corporation had recently introduced its "printing telegraph," a device that made it possible to communicate without the intermediary operator. When news reached headquarters that subscribers were dropping this new contrivance and subscribing to telephones, the Western Union first understood that a competitor had entered their field. Promptly organizing the American Speaking Telephone Company, the Western Union, with all its wealth and prestige, proceeded to destroy this insolent pigmy. Its methods of attack were unscrupulous and underhanded, the least discreditable one being the use of its political influence to prevent communities from giving franchises to the Bell Company. But this corporation mainly relied for success upon the wholesale manner in which it infringed the Bell patents. It raked together all possible claimants to priority, from Philip Reis

to Elisha Gray, in its attempts to discredit Bell as the inventor. The Western Union had only one legitimate advantage — the Edison transmitter — which was unquestionably much superior to anything which the Bell Company then possessed. Many Bell stockholders were discouraged in face of this fierce opposition and wished to abandon the fight. Not so Vail. The mere circumstance that the great capitalists of the Western Union had taken up the telephone gave the public a confidence in its value which otherwise it would not have had, a fact which Vail skillfully used in attracting influential financial support. He boldly sued the Western Union in 1878 for infringement of the Bell patents. The case was a famous one; the whole history of the telephone was reviewed from the earliest days, and the evidence as to rival claimants was placed on record for all time. After about a year, Mr. George Clifford, perhaps the best patent attorney of the day, who was conducting the case for the Western Union, quietly informed his clients that they could never win, for the records showed that Bell was the inventor. He advised the Western Union to settle the case out of court and his advice was taken. This great corporation war was concluded by a treaty (November 10, 1879) in

which the Western Union acknowledged that Bell was the inventor, that his patents were valid, and agreed to retire from the telephone business. The Bell Company, on its part, agreed to buy the Western Union Telephone System, to pay the Western Union a royalty of twenty per cent on all telephone rentals, and not to engage in the telegraph business. Had this case been decided against the Bell Company it is almost certain that the telephone would have been smothered in the interest of the telegraph and its development delayed for many years.

Soon after the settlement of the Western Union suit, the original group which had created the telephone withdrew from the scene. Bell went back to teaching deaf-mutes. He has since busied himself with the study of airplanes and wireless, and has invented an instrument for transmitting sound by light. The new telephone company offered him $10,000 a year as chief inventor, but he replied that he could not invent to order. Thomas Sanders received somewhat less than $1,000,000 and lost most of it exploiting a Colorado gold mine. Gardiner Hubbard withdrew from business and devoted the last years of his life to the National Geographic Society. Thomas Watson, after retiring from the

telephone business, bought a ship-building yard near Boston, which has been successful.

In making this settlement with the Western Union, the Bell interests not only eliminated a competitor but gained great material advantages. They took over about 56,000 telephone stations located in 55 cities and towns. They also soon acquired the Western Electric Manufacturing Company, which under the control of the Western Union had developed into an important concern for the manufacture of telephone supplies. Under the management of the Bell Company this corporation, which now has extensive factories in Hawthorne, Ill., produces two-thirds of the world's telephone apparatus. With the Western Electric Vail has realized the fundamental conception underlying his ideal telephone system — the standardization of equipment. For the accomplishment of his idea of a national telephone system, instead of a parochial one, Mr. Vail organized, in 1881, the American Bell Telephone Company, a corporation that really represented the federalization of all the telephone activities of the subsidiary companies. The United States was divided into several sections, in each of which a separate company was organized to develop the telephone possibilities of that

particular area. In 1899 the American Telephone and Telegraph Company took over the business and properties of the American Bell Company. The larger corporation built toll lines, connected these smaller systems with one another, and thus made it possible for Washington to talk to New York, New York to Chicago, and ultimately — Boston to San Francisco. An enlightened policy led the Bell Company frequently to establish exchanges in places where there was little chance of immediate profit. Under this stimulation the use of this instrument extended rapidly, yet it is in the last twenty years that the telephone has grown with accelerated momentum. In 1887 there were 170,000 subscribers in the United States, and in 1900 there were 610,000; but in 1906 the American Telephone and Telegraph Company was furnishing its service to 2,550,000 stations, and in 1916 to 10,000,000. Clearly it is only since 1900 that the telephone has become a commonplace of American existence. Up to 1900 it had grown at the rate of about 13,000 a year; whereas since 1900 it has grown at the rate of 700,000 a year. The explanation is that charges have been so reduced that the telephone has been brought within the reach of practically every business house and every family.

Until the year 1900 every telephone subscriber had to pay $240 a year, and manifestly only families in affluent circumstances could afford such a luxury. About that time a new system of charges known as the "message rate" plan was introduced, according to which the subscriber paid a moderate price for a stipulated number of calls, and a pro rata charge for all calls in excess of that number. Probably no single change in any business has had such an instantaneous effect. The telephone, which had hitherto been an external symbol of prosperity, suddenly became the possession of almost every citizen.

Other companies than the Bell interests have participated in this development. The only time the Bell Company has had no competitor, Mr. Vail has said, was at the Philadelphia Centennial in 1876. Some of this competition has benefited the public but much of it has accomplished little except to enrich many not over-scrupulous promoters. Groups of farmers who frequently started companies to furnish service at cost did much to extend the use of the telephone. Many of the companies which, when the Bell patents expired in 1895, sprang up in the Middle West, also manifested great enterprise and gave excellent service. These

companies have made valuable contributions, of which perhaps the automatic telephone, an instrument which enables a subscriber to call up his "party" directly, without the mediation of "central," is the most ingenious. Although due acknowledgment must be made of the honesty and enterprise with which hundreds of the independents are managed, the fact remains that they are a great economic waste. Most of them give only a local service, no company having yet arisen which aims to duplicate the comprehensive national plans of the greater corporation. As soon as an independent obtains a foothold, the natural consequence is that every business house and private household must either be contented with half service, or double the cost of the telephone by subscribing to two companies. It is not unlikely that the "independents" have exercised a wholesome influence upon the Bell Corporation, but, as the principle of government regulation rather than individual competition has now become the established method of controlling monopoly, this influence will possess less virtue in the future. In addition to these independent enterprises, the telephone has unfortunately furnished an opportunity for stock-jobbing schemes on a considerable scale. The years from

1895 to 1905 witnessed the growth of many bubbles of this kind; one group of men organized not far from two hundred telephone companies. They would go into selected communities, promise a superior service at half the current rates, enlist the coöperation of "leading" business men, sell the stock largely in the city or town to be benefited. make large profits in the construction of the lines and the sale of equipment — and then decamp for pastures new. The multitudinous bankruptcies that followed in the wake of such exploiters at length brought their activities to an end.

CHAPTER V

THE DEVELOPMENT OF PUBLIC UTILITIES

The streets of practically all American cities, as they appeared in 1870 and as they appear today, present one of the greatest contrasts in our industrial development. Fifty years ago only a few flickering gas lamps lighted the most traveled thoroughfares. Only the most prosperous business houses and homes had even this expensive illumination; most obtained their artificial light from the new illuminant known as kerosene. But it was the mechanism of city transportation that would have looked the strangest in our eyes. New York City had built the world's first horse-car line in 1832, and since that year this peculiarly American contrivance has had the most extended development. In 1870, indeed, practically every city of any importance had one or more railways of this type. New York possessed thirty different companies, each operating an independent system. In Philadelphia,

Chicago, St. Louis, and San Francisco the growth of urban transportation had been equally haphazard. The idea of combining the several street railways into one comprehensive corporation had apparently occurred to no one. The passengers, in their peregrinations through the city, had frequently to pay three or four fares; competition was thus the universal rule. The mechanical equipment similarly represented a primitive state of organization. Horses and mules, in many cases hideous physical specimens of their breeds, furnished the motive power. The cars were little "bobtailed" receptacles, usually badly painted and more often than not in a desperate state of disrepair. In many cities the driver presided as a solitary autocrat; the passengers on entrance deposited their coins in a little fare box. At night tiny oil lamps made the darkness visible; in winter time shivering passengers warmed themselves by pulling their coat collars and furs closely about their necks and thrusting their lower members into a heap of straw, piled almost a foot deep on the floor.

Who would have thought, forty years ago, that the lighting of these dark and dirty streets and the modernization of these local railway systems would have given rise to one of the most astounding

chapters in our financial history and created hundreds, perhaps thousands, of millionaires? When Thomas A. Edison invented the incandescent light, and when Frank J. Sprague in 1887 constructed the first practicable urban trolley line, in Richmond, Virginia, they liberated forces that powerfully affected not only our social and economic life but our political institutions. These two inventions introduced a new phrase — "Public Utilities." Combined with the great growth and prosperity of the cities they furnished a fruitful opportunity to several particularly famous groups of financial adventurers. They led to the organization of "syndicates" which devoted all their energies, for a quarter of a century, to exploiting city lighting and transportation systems. These syndicates made a business of entering city after city, purchasing the scattered street railway lines and lighting companies, equipping them with electricity, combining them into unified systems, organizing large corporations, and floating huge issues of securities. A single group of six men — Yerkes, Widener, Elkins, Dolan, Whitney, and Ryan — combined the street railways, and in many cases the lighting companies, of New York, Philadelphia, Chicago, Pittsburgh, and at least a hundred towns and cities in Pennsylvania,

Connecticut, Rhode Island, Massachusetts, Ohio, Indiana, New Hampshire, and Maine. Either jointly or separately they controlled the gas and electric lighting companies of Philadelphia, Reading, Harrisburg, Atlanta, Vicksburg, St. Augustine, Minneapolis, Omaha, Des Moines, Kansas City, Sioux City, Syracuse, and about seventy other communities. A single corporation developed nearly all the trolley lines and lighting companies of New Jersey; another controlled similar utilities in San Francisco and other cities on the Pacific Coast. In practically all instances these syndicates adopted precisely the same plan of operation. In so far as their activities resulted in cheap, comfortable, rapid, and comprehensive transit systems and low-priced illumination, their activities greatly benefited the public. The future historian of American society will probably attribute enormous influence to the trolley car in linking urban community with urban community, in extending the radius of the modern city, in freeing urban workers from the demoralizing influences of the tenement, in offering the poorer classes comfortable homes in the surrounding country, and in extending general enlightenment by bringing about a closer human intercourse. Indeed, there is probably no single

influence that has contributed so much to the pleasure and comfort of the masses as the trolley car.

Yet the story that I shall have to tell is not a pleasant one. It is impossible to write even a brief outline of this development without plunging deeply into the two phases of American life of which we have most cause to be ashamed; these are American municipal politics and the speculative aspects of Wall Street. The predominating influences in American city life have been the great franchise corporations. Practically all the men that have had most to do with developing our public utilities have also had the greatest influence in city politics. In New York, Thomas F. Ryan and William C. Whitney were the powerful, though invisible, powers in Tammany Hall. In Chicago, Charles T. Yerkes controlled mayors and city councils; he even extended his influence into the state government, controlling governors and legislatures. In Philadelphia, Widener and Elkins dominated the City Hall and also became part of the Quay machine of Pennsylvania. Mark Hanna, the most active force in Cleveland railways, was also the political boss of the State. Roswell P. Flower, chief agent in developing Brooklyn Rapid Transit, had been Governor of New York; Patrick

Calhoun, who monopolized the utilities of San Francisco and other cities, presided likewise over the city's inner politics. The Public Service Corporation of New Jersey also comprised a large political power in city and state politics. It is hardly an exaggeration to say that in the most active period, that from 1880 to 1905, the powers that developed city railway and lighting companies in American cities were identically the same owners that had the most to do with city government. In the minds of these men politics was necessarily as much a part of their business as trolley poles and steel rails. This type of capitalist existed only on public franchises — the right to occupy the public streets with their trolley cars, gas mains, and electric light conduits; they could obtain these privileges only from complaisant city governments, and the simplest way to obtain them was to control these governments themselves. Herein we have the simple formula which made possible one of the most profitable and one of the most adventurous undertakings of our time.

An attempt to relate the history of all these syndicates would involve endless repetition. If we have the history of one we have the history of practically all. I have therefore selected, as

typical, the operations of the group that developed the street railways and, to a certain extent, the public lighting companies, in our three greatest American cities — New York, Chicago, and Philadelphia.

One of the men who started these enterprises actually had a criminal record. William H. Kemble, an early member of the Philadelphia group, had been indicted for attempting to bribe the Pennsylvania Legislature; he had been convicted and sentenced to one year in the county jail and had escaped imprisonment only by virtue of a pardon obtained through political influence. Charles T. Yerkes, one of his partners in politics and street railway enterprises, had been less fortunate, for he had served seven months for assisting in the embezzlement of Philadelphia funds in 1873. It was this circumstance in Yerkes's career which impelled him to leave Philadelphia and settle in Chicago where, starting as a small broker, he ultimately acquired sufficient resources and influence to embark in that street railway business at which he had already served an extensive apprenticeship. Under his domination, the Chicago aldermen attained a depravity that made them notorious all over the world. They openly sold Yerkes the use of the

streets for cash and constantly blocked the efforts which an infuriated populace made for reform. Yerkes purchased the old street railway lines, lined his pockets by making contracts for their reconstruction, issued large flotations of watered stock, heaped securities upon securities and reorganization upon reorganization and diverted their assets to business in a hundred ingenious ways.

In spite of the crimes which Yerkes perpetrated in American cities, there was something refreshing and ingratiating about the man. Possibly this is because he did not associate any hypocrisy with his depredations. "The secret of success in my business," he once frankly said, "is to buy old junk, fix it up a little, and unload it upon other fellows." Certain of his epigrams — such as, "It is the strap-hanger who pays the dividends" — have likewise given him a genial immortality. The fact that, after having reduced the railway system of Chicago to financial pulp and physical dissolution, he finally unloaded the whole useless mass, at a handsome personal profit, upon his old New York friends, Whitney and Ryan, and decamped to London, where he carried through huge transit enterprises, clearly demonstrated that Yerkes was a buccaneer of no ordinary caliber.

Yerkes's difficulties in Philadelphia indirectly made possible the career of Peter A. B. Widener. For Yerkes had become involved in the defalcation of the City Treasurer, Joseph P. Mercer, whose translation to the Eastern Penitentiary left vacant a municipal office into which Mr. Widener now promptly stepped. Thus Mr. Widener, as is practically the case with all these street railway magnates, was a municipal politician before he became a financier. The fact that he attained the city treasurership shows that he had already gone far, for it was the most powerful office in Philadelphia. He had all those qualities of suavity, joviality, firmness, and personal domination that made possible success in American local politics a generation ago. His occupation contributed to his advancement. In recent years Mr. Widener, as the owner of great art galleries and the patron of philanthropic and industrial institutions, has been a national figure of the utmost dignity. Had you dropped into the Spring Garden Market in Philadelphia forty years ago, you would have found a portly gentleman, clad in a white apron, and armed with a cleaver, presiding over a shop decorated with the design — "Peter A. B. Widener, Butcher." He was constantly joking with his customers and

visitors, and in the evening he was accustomed to foregather with a group of well-chosen spirits who had been long famous in Philadelphia as the "all-night poker players." A successful butcher shop in Philadelphia in those days played about the same part in local politics as did the saloon in New York City. Such a station became the headquarters of political gossip and the meeting ground of a political clique; and so Widener, the son of a poor German bricklayer, rapidly became a political leader in the Twentieth Ward, and soon found his power extending even to Harrisburg. A few years ago Widener presided over a turbulent meeting of Metropolitan shareholders in Newark, New Jersey. The proposal under consideration was the transference of all the Metropolitan's visible assets to a company of which the stockholders knew nothing. When several of these stockholders arose and demanded that they be given an opportunity to discuss the projected lease, Widener turned to them and said, in his politest and blandest manner: "You can vote first and discuss afterward." Widener displayed precisely these same qualities of ingratiating arrogance and good-natured contempt as a Philadelphia politician. He was a man of big frame, alert and decisive in his movements,

and a ready talker; in business he was given much to living in the clouds — a born speculator — emphatically a "boomer." His sympathies were generous, at times emotional; it is said that he has even been known to weep when discussing his fine collection of Madonnas. He showed this personal side in his lifelong friendship and business association with William L. Elkins, a man much inferior to him in ability. Indeed, Elkins's great fortune was little more than a free gift from Widener, who carried him as a partner in all his deals. Elkins became Widener's bondsman when the latter entered the City Treasurer's office; the two men lived near each other on the same street, and this association was cemented when Widener's oldest son married Elkins's daughter. Elkins had started life as an entry clerk in a grocery store, had made money in the butter and egg business, had "struck oil" at Titusville in 1862, and had succeeded in exchanging his holdings for a block of Standard Oil stock. He too became a Philadelphia politician, but he had certain hard qualities — he was close-fisted, slow, plodding — that prevented him from achieving much success.

For the other members of this group we must now change the scene to New York City. In the early

eighties certain powerful interests had formed plans for controlling the New York transit fields. Prominent among them was William Collins Whitney, a very different type of man from the Philadelphians. Born in Conway, Massachusetts, in 1841, he came from a long line of distinguished and intellectual New Englanders. At Yale his wonderful mental gifts raised him far above his fellows; he divided all scholastic honors there with his classmate, William Graham Sumner, afterwards Yale's great political economist. Soon after graduation Whitney came to New York and rapidly forged ahead as a lawyer. Brilliant, polished, suave, he early displayed those qualities which afterward made him the master mind of presidential Cabinets and the maker of American Presidents. Physically handsome, loved by most men and all women, he soon acquired a social standing that amounted almost to a dictatorship. His early political activities had greatly benefited New York. He became a member of that group which, under the leadership of Joseph H. Choate and Samuel J. Tilden, accomplished the downfall of William M. Tweed. Whitney remained Tilden's political protégé for several years. Though high-bred and luxury-loving, as a young man he was not averse to hard political work, and many

old-timers still remember the days when "Bill" Whitney delivered cart-tail harangues on the lower east side. By 1884 he had become the most prominent Democrat in New York — always a foe to Tammany — and as such he contributed largely to Cleveland's first election, became Secretary of the Navy in Cleveland's cabinet and that great President's close friend and adviser. As Secretary of the Navy, Whitney, who found the fleet composed of a few useless hulks left over from the days of Farragut, created the fighting force that did such efficient service in the Spanish War. The fact that the United States is now the third naval power is largely owing to these early activities of Whitney.

Certainly all this national service forms a strange prelude to Whitney's activities in the public utilities of New York and other cities. Had he died, indeed, in his fiftieth year, his name would be renowned today as a worker for the highest ideals of American citizenship. What suddenly made him turn his back upon his past, join his former enemies in Tammany Hall, and engage in these great speculative enterprises? The simplest explanation is that, with his ability and ambition, Whitney had the luxurious tastes of a

Medici. At the height of his career his financial success found expression in a magnificent house which he established on Fifth Avenue. Its furnishings were one of the wonders of New York. Whitney ransacked the art treasures of Europe, stripped medieval castles of their carvings and tapestries, ripped whole staircases and ceilings from the repose of centuries, and relaid them in this abode of splendor, and here he entertained with a lavishness that astounded New York. This single exploit pictures the man. Everything that Whitney did and was — his house, his financial transactions, his Wall Street speculations, the rewards which he gave his friends — assumed heroic proportions. But these things all demanded money. The dilapidated horse railways of New York offered him his most convenient opportunity for amassing it.

But Whitney had not proceeded far when he came face to face with a quiet and energetic young man who had already made considerable progress in the New York transit field. This was a Virginian of South Irish descent who had started life as a humble broker's clerk twelve or fourteen years before. His name was Thomas Fortune Ryan. Few men have wielded greater power in American finance, but in 1884 Ryan was merely a

ruddy-faced, clean-cut, and clean-living Irishman of thirty-three, who could be depended on to execute quickly and faithfully orders on the New York Stock Exchange — even though they were small ones — and who, in unostentatious fashion, had already acquired much influence in Tammany Hall. With his six feet of stature, his extremely slender figure, his long legs, his long arms, his raiment — which always represented the height of fashion and tended slightly toward the flashy — Ryan made a conspicuous figure wherever he went. He was born in 1851, on a small farm in Nelson County, Virginia. The Civil War, which broke out when Ryan was a boy of ten, destroyed the family fortune and in 1868, when seventeen, he began life as a dry-goods clerk in Baltimore, fulfilling the tradition of the successful country boy in the large city by marrying his employer's daughter. When his father-in-law failed, in 1870, Ryan came to New York, went to work in a broker's office, and succeeded so well that, in a few years, he was able to purchase a seat on the Stock Exchange. He was sufficiently skillful as a broker to number Jay Gould among his customers and to inspire a prophecy by William C. Whitney that, if he retained his health, he would become one of the richest men

in the country. Afterwards, when he knew him more intimately, Whitney elaborated this estimate by saying that Ryan was "the most adroit, suave, and noiseless man he had ever known." Ryan had two compelling traits that soon won for him these influential admirers. First of all was his marvelous industry. His genius was not spasmodic. He worked steadily, regularly, never losing a moment, never getting excited, going, day after day, the same monotonous dog-trot, easily outdistancing scores of apparently stronger men. He also had the indispensable faculty of silence. He has always been the least talkative man in Wall Street, but, with all his reserve, he has remained the soul of courtesy and outward good nature.

Here, then, we have the characters of this great impending drama — Yerkes in Chicago, Widener and Elkins in Philadelphia, Whitney and Ryan in New York. These five men did not invariably work as a unit. Yerkes, though he had considerable interest in Philadelphia, which had been the scene of his earliest exploits, limited his activities largely to Chicago. Widener and Elkins, however, not only dominated Philadelphia traction but participated in all of Yerkes's enterprises in Chicago and held an equal interest with Whitney and

Ryan in New York. The latter Metropolitan pair, though they confined their interest chiefly to their own city, at times transferred their attention to Chicago. Thus, for nearly thirty years, these five men found their oyster in the transit systems of America's three greatest cities — and, for that matter, in many others also.

An attempt to trace the convolutions of America's street railway and public lighting finance would involve a puzzling array of statistics and an inextricable complexity of stocks, bonds, leases, holding companies, operating companies, construction companies, reorganizations, and the like. Difficult and apparently impenetrable as is this financial morass, the essential facts still stand out plainly enough. As already indicated, the fundamental basis upon which the whole system rested was the control of municipal politics. The story of the Metropolitan's manipulation of the New York street railways starts with one of the most sordid episodes in the municipal annals of America's largest city. Somewhat more than thirty years ago, a group of New York city fathers acquired an international fame as the "boodle aldermen." These men had finally given way to the importunities of a certain Jacob Sharp, an eccentric

New York character, who had for many years operated New York City railways, and granted a franchise for the construction of a horse-car line on lower Broadway. Soon after voting this franchise, regarded as perhaps the most valuable in the world, these same aldermen had begun to wear diamonds, to purchase real estate, and give other outward evidences of unexpected prosperity. Presently, however, these city fathers started a migration to Canada, Mexico, Spain, and other countries where the processes of extradition did not work smoothly. Sharp's enemies had succeeded in precipitating a legislative investigation under the very capable leadership of Roscoe Conkling, who had little difficulty in showing that Sharp had purchased his aldermen for $500,000 cash. In a short time, such of the aldermen as were accessible to the police were languishing in prison, and Sharp had been arrested on twenty-one indictments for bribery and sentenced to four years' hard labor — a sentence which he was saved from serving by his lonely and miserable death in Ludlow Street Jail. In the delirium preceding his dissolution Sharp raved constantly about his Broadway railroad and his enemies; it was apparently his belief that the investigation which had

uncovered his rascality and the subsequent "persecutions" had been engineered by certain of his rivals, either to compel Sharp to disgorge his franchise or to produce the facts that would justify the legislature in annulling it on the ground of fraud.

Though the complete history of this transaction can never be written, we do possess certain facts that lend some color to this diagnosis. Up to the time that Sharp had captured this franchise, Ryan, Whitney, and the Philadelphians — not as partners, but as rivals — had competed with him for this prize. At the trial of Arthur J. McQuade in 1886, a fellow conspirator, who bore the somewhat suggestive name of Fullgraff, related certain details which, if true, would indicate that Sharp's methods differed from those of his rivals only in that they had proved more successful. Thirteen members of the Board of Aldermen, said Fullgraff, had formed a close corporation, elected a chairman, and adopted a policy of "business unity in all important matters," which meant that they proposed to keep together in order to secure the highest price for the Broadway franchise. The cable railroad, which was the one with which Mr. Ryan was identified, offered $750,000, half in bonds and half in cash.

Mr. Sharp, however, offered $500,000 all in cash. The aldermen voted in favor of Sharp because cash was not only a more valuable commodity than the bonds but, to use Alderman Fullgraff's own words — "less easily traced." That Whitney financed lawsuits against the validity of Sharp's franchise appears upon the record, and that Ryan was actively promoting the Conkling investigation, is likewise a matter of evidence. Sharp's victory had the great result of bringing together the three forces — Ryan, Whitney, and the Philadelphians — who had hitherto combated one another as rivals; that is, it caused the organization of the famous Whitney-Ryan-Widener-Elkins syndicate. If these men had inspired all those attacks on Sharp, their maneuver proved successful; for when the investigation had attained its climax and public indignation against Sharp had reached its most furious stage, that venerable corruptionist, worn down by ill health, and almost crazed by the popular outcry, sold his Broadway railroad to Peter A. B. Widener, William L. Elkins, and William H. Kemble. Thomas F. Ryan became secretary of the new corporation, and William C. Whitney an active participant in its affairs.

This Broadway franchise formed the vertebral

column of the New York transit system; with it as a basis, the operators formed the Metropolitan Street Railway Company in 1893, commonly known as the "Metropolitan." They organized also the Metropolitan Traction Company, an organization which enjoys an historic position as the first "holding company" ever created in this country. Its peculiar attribute was that it did not construct and operate street railways itself, but merely owned other corporations that did so. Its only assets, that is, were paper securities representing the ownership and control of other companies. This "holding company," which has since become almost a standardized form of corporation control in this country, was the invention of Mr. Francis Lynde Stetson, one of America's greatest corporation lawyers. "Mr. Stetson," Ryan is said to have remarked, "do you know what you did when you drew up the papers of the Metropolitan Traction Company? You made us a great big tin box."

The plan which Whitney and his associates now followed was to obtain control, in various ways, of all the surface railways in New York and place them under the leadership of the Metropolitan. Through their political influences they obtained franchises of priceless value, organized subsidiary

street railway companies, and exchanged the stock of these subsidiary companies for that of the Metropolitan. A few illustrations will show the character of these transactions. They thus acquired, practically as a free gift, a franchise to build a cable railroad on Lexington Avenue. At an extremely liberal estimate, this line cost perhaps $2,500,000 to construct, yet the syndicate turned this over to the Metropolitan for $10,000,000 of Metropolitan securities. They similarly acquired a franchise for a line on Columbus Avenue, spending perhaps $500,000 in construction, and handing the completed property over to the Metropolitan for $6,000,000. In exchange for these two properties, representing a real investment, it has been maintained, of $3,000,000, the inside syndicates received securities which had a face value of $16,000,000 and which, as will appear subsequently, had a market cash value of not far from $25,000,000. They purchased an old horse-car line on Fulton Street, a line whose assets consisted of one-third of a mile of tracks, ten little box cars, thirty horses, and an operating deficit of $40,000 a year. At auction, its visible assets might have brought $15,000; yet the syndicate turned this over to the Metropolitan for $1,000,000. They spent $50,000

in constructing and equipping a horse railroad on Twenty-eighth and Twenty-ninth Streets and turned this over to the Metropolitan for $3,000,000. For two and a half miles of railroad on Thirty-fourth Street, which represented a cash expenditure of perhaps $100,000, they received $2,000,000 of Metropolitan stock. But it is hardly necessary to catalogue more instances; the plan of operations must now be fairly evident. It was for the members of the syndicate, as individuals, to collect all the properties and new franchises that were available and to transfer them to the Metropolitan at enormously inflated values. So far, all these deals were purely stock transactions — no cash had yet changed hands. When the amalgamation was complete, the insiders found themselves in possession of large amounts of Metropolitan stock. Their scheme for transforming this paper into more tangible property forms the concluding chapter of this Metropolitan story.[1]

Nearly all the properties actually purchased and transferred in the manner described above, had little earning capacity, and therefore little value; they were decrepit horse-car lines in unprofitable

[1] In 1897 the Traction Company dissolved, after distributing $6,000,000 as "a voluntary dividend" among its stockholders.

territory. The really valuable roads were those that traversed the great north and south thoroughfares — Lenox, Third, Fourth, Sixth, Eighth, and Ninth Avenues. Many old New York families and estates had held these properties for years and had collected large annual dividends from them. Naturally they had no desire to sell, yet their acquisition was essential to the monopoly which the Whitney-Ryan syndicate aspired to construct. They finally leased all these roads, under agreements which guaranteed large annual rentals. In practically all these cases the Metropolitan, in order to secure physical possession, agreed to pay rentals that far exceeded the earning capacity of the road. What is the explanation of such insane finance? We do not have the precise facts in the matter of the New York railways; but similar operations in Chicago, which have been officially made public, shed the utmost light upon the situation. In order to get possession of a single road in Chicago, Widener and Elkins guaranteed a thirty-five per cent dividend; to get one Philadelphia line, they guaranteed 65½ per cent on capital paid in. This, of course, was not business; the motives actuating the syndicate were purely speculative. In Chicago, Widener and Elkins quietly made large purchases

of the stock in these roads before they leased them to the parent company. The exceedingly profitable lease naturally gave such stocks a high value, in case they preferred to sell; if they held them, they reaped huge rewards from the leases which they had themselves decreed. Perhaps their most remarkable exploit was the lease of the West Division Railway Company of Chicago to the West Chicago Street Railroad. Widener and Elkins controlled the West Division Railway; their partner, Charles T. Yerkes, controlled the latter corporation. The negotiation of a lease, therefore, was a purely informal matter; the partners were merely dealing with one another; yet Widener and Elkins received a fee of $5,000,000 as personal compensation for negotiating this lease!

But this whole leasing system, both in New York and Chicago, entailed scandals perhaps even more reprehensible. All these leased properties, when taken over, were horse-car lines, and their transformation into electrically propelled systems involved reconstruction operations on an extensive scale. It seems perfectly clear that the chief motive which inspired these extravagant leases was the determination of the individuals who made up the syndicate to obtain physical possession and

to make huge profits on construction. The "construction accounts" of the Metropolitan in New York form the most mysterious and incredible chapter in its history. The Metropolitan reports show that they spent anywhere from $500,000 to $600,000 a mile building underground trolley lines which, at their own extravagant estimate, should have cost only $150,000. In a few years untold millions, wasted in this way, disappeared from the Metropolitan treasury. In 1907 the Public Service Commission of New York began investigating these "construction accounts," but it had not proceeded far when the discovery was made that all the Metropolitan books containing the information desired had been destroyed. All the ledgers, journals, checks, and vouchers containing the financial history of the Metropolitan since its organization in 1893 had been sold for $117 to a junkman, who had agreed in writing to grind them into pulp, so that they would be safe from "prying eyes." We shall therefore never know precisely how this money was spent. But here again the Chicago transactions help us to an understanding. In 1898 Charles T. Yerkes, with that cynical frankness which some people have regarded as a redeeming trait in his character, opened his books for the

preceding twenty-five years to the Civic Federation of Chicago. These books disclosed that Mr. Yerkes and his associates, Widener and Elkins, had made many millions in reconstructing the Chicago lines at prices which represented gross overcharges to the stockholders. For this purpose Yerkes, Widener, and Elkins organized the United States Construction Company and made contracts for installing the new electric systems on the lines which they controlled by lease or stock ownership. It seems a not unnatural suspicion that the vanished Metropolitan books would have disclosed similar performances in New York.

The concluding chapter of this tragedy has its setting in the Stock Exchange. These inside gentlemen, as already said, received no cash as their profits from these manipulations — only stock. But in the eyes of the public this stock represented an enormous value. Metropolitan securities, for example, represented the control and ownership of all the surface transit business in the city of New York. Naturally, it had a great investment value. When it began to pay regularly seven per cent dividends, the public appetite for Metropolitan became insatiable. The eager purchasers did not know, what we know now, that the Metropolitan did not

earn these dividends and never could have earned them. The mere fact that it was paying, as rentals on its leased lines, annual sums far in excess of their earning capacity, necessarily prevented anything in the nature of profitable operation. The unpleasant fact is that these dividends were paid with borrowed money merely to make the stock marketable. It is not unlikely that the padded construction accounts, already described, may have concealed large disbursements of money for unearned dividends. When the Metropolitan was listed in 1897, it immediately went beyond par. The excitement that followed forms one of the most memorable chapters in the history of Wall Street. The investing public, egged on by daring and skillful stock manipulators, simply went mad and purchased not only Metropolitan but street railway shares that were then even more speculative. It was in these bubble days that Brooklyn Rapid Transit soared to heights from which it subsequently descended precipitately. Under this stimulus, Metropolitan stock ultimately sold at $269 a share. While the whole investing public was scrambling for Metropolitan, the members of the exploiting syndicate found ample opportunity to sell. The real situation became apparent when William

C. Whitney died in 1904 leaving an estate valued at $40,000,000. Not a single share of Metropolitan was found among his assets! The final crash came in 1907, when the Metropolitan, a wrecked and plundered shell, confessed insolvency and went into a receivership. Those who had purchased its stock found their holdings as worthless as the traditional western gold mine. The story of the Chicago and Philadelphia systems, as well as that of numerous other cities, had been essentially the same. The transit facilities of millions of Americans had merely become the instruments of a group of speculators who had made huge personal fortunes and had left, as a monument of their labors, street railway lines whose gross overcapitalization was apparent to all and whose physical dilapidation in many cases revealed the character of their management.

It seems perhaps an exaggeration to say that the enterprises which have resulted in equipping our American cities and suburbs with trolley lines and electric lighting facilities have followed the plan of campaign sketched above. Perhaps not all have repeated the worst excesses of the syndicate that so remorselessly exploited New York, Chicago, and Philadelphia. Yet in most cases these elaborate undertakings have been largely speculative in

character. Huge issues of fictitious stock, created purely for the benefit of inner rings, have been almost the prevailing rule. Stock speculation and municipal corruption have constantly gone hand in hand everywhere with the development of the public utilities. The relation of franchise corporations to municipalities is probably the thing which has chiefly opened the eyes of Americans to certain glaring defects in their democratic organization. The popular agitation which has resulted has led to great political reforms. The one satisfaction which we can derive from such a relation as that given above is that, after all, it is representative of a past era in our political and economic life. No new "Metropolitan syndicate" can ever repeat the operations of its predecessors. Practically every State now has utility commissions which regulate the granting of franchises, the issue of securities, the details of construction and equipment and service. An awakened public conscience has effectively ended the alliance between politics and franchise corporations and the type of syndicate described in the foregoing pages belongs as much to our American past as that rude frontier civilization with which, after all, it had many characteristics in common.

CHAPTER VI

MAKING THE WORLD'S AGRICULTURAL MACHINERY

THE Civil War in America did more than free the negro slave: it freed the white man as well. In the Civil War agriculture, for the first time in history, ceased to be exclusively a manual art. Up to that time the typical agricultural laborer had been a bent figure, tending his fields and garnering his crops with his own hands. Before the war had ended the American farmer had assumed an erect position; the sickle and the scythe had given way to a strange red chariot, which, with practically no expenditure of human labor, easily did the work of a dozen men. Many as have been America's contributions to civilization, hardly any have exerted greater influence in promoting human welfare than her gift of agricultural machinery. It seems astounding that, until McCormick invented his reaper, in 1831, agricultural methods, in both the New and the Old World, differed little from those

that had prevailed in the days of the Babylonians. The New England farmer sowed his fields and reaped his crops with almost identically the same instruments as those which had been used by the Roman farmer in the time of the Gracchi. Only a comparatively few used the scythe; the great majority, with crooked backs and bended knees, cut the grain with little hand sickles precisely like those which are now dug up in Etruscan and Egyptian tombs.

Though McCormick had invented his reaper in 1831, and though many rival machines had appeared in the twenty years preceding the Civil War, only the farmers on the great western plains had used the new machinery to any considerable extent. The agricultural papers and agricultural fairs had not succeeded in popularizing these great labor-saving devices. Labor was so abundant and so cheap that the farmer had no need of them. But the Civil War took one man in three for the armies, and it was under this pressure that the farmers really discovered the value of machinery. A small boy or girl could mount a McCormick reaper and cut a dozen acres of grain in a day. This circumstance made it possible to place millions of soldiers in the field and to feed the armies from farms on

which mature men did very little work. But the reaper promoted the Northern cause in other ways. Its use extended so in the early years of the war that the products of the farms increased on an enormous scale, and the surplus, exported to Europe, furnished the liquid capital that made possible the financing of the war. Europe gazed in astonishment at a new spectacle in history; that of a nation fighting the greatest war which had been known up to that time, employing the greater part of her young and vigorous men in the armies, and yet growing infinitely richer in the process. The Civil War produced many new implements of warfare, such as the machine gun and the revolving turret for battleships, but, so far as determining the result was concerned, perhaps the most important was the reaper.

Extensive as the use of agricultural machinery became in the Civil War, that period only faintly foreshadowed the development that has taken place since. The American farm is today like a huge factory; the use of the hands has almost entirely disappeared; there are only a few operations of husbandry that are not performed automatically. In Civil War days the reaper merely cut the grain; now machinery rakes it up and binds it into sheaves

and threshes it. Similar mechanisms bind corn and rice. Machinery is now used to plant potatoes; grain, cotton, and other farm products are sown automatically. The husking bees that formed one of our social diversions in Civil War days have disappeared, for particular machines now rip the husks off the ears. Horse hay-forks and horse hay-rakes have supplanted manual labor. The mere names of scores of modern instruments of farming, all unknown in Civil War days — hay carriers, hay loaders, hay stackers, manure spreaders, horse corn planters, corn drills, disk harrows, disk ploughs, steam ploughs, tractors, and the like — give some suggestion of the extent to which America has made mechanical the most ancient of occupations. In thus transforming agriculture, we have developed not only our own Western plains, but we have created new countries. Argentina could hardly exist today except for American agricultural machinery. Ex-President Loubet declared, a few years ago, that France would starve to death except for the farming machines that were turned out in Chicago. There is practically no part of the world where our self-binders are not used. In many places America is not known as the land of freedom and opportunity, but merely as "the place

from which the reapers come." The traveler suddenly comes upon these familiar agents in every European country, in South America, in Egypt, China, Algiers, Siberia, India, Burma, and Australia. For agricultural machinery remains today, what it has always been, almost exclusively an American manufacture. It is practically the only native American product that our European competitors have not been able to imitate. Tariff walls, bounty systems, and all the other artificial aids to manufacturing have not developed this industry in foreign lands, and today the United States produces four-fifths of all the agricultural machinery used in the world. The International Harvester Company has its salesmen in more than fifty countries, and has established large American factories in many nations of Europe.

One day, a few years before his death, Prince Bismarck was driving on his estate, closely following a self-binder that had recently been put to work. The venerable statesman, bent and feeble, seemed to find a deep melancholy interest in the operation.

"Show me the thing that ties the knot," he said. It was taken to pieces and explained to him in detail.

"Can these machines be made in Germany?" he asked.

"No, your Excellency," came the reply. "They can be made only in America."

The old man gave a sigh. "Those Yankees are ingenious fellows," he said. "This is a wonderful machine."

In this story of American success, four names stand out preëminently. The men who made the greatest contributions were Cyrus H. McCormick, C. W. Marsh, Charles B. Withington, and John F. Appleby. The name that stands foremost, of course, is that of McCormick, but each of the others made additions to his invention that have produced the present finished machine. It seems like the stroke of an ironical fate which decreed that since it was the invention of a Northerner, Eli Whitney, that made inevitable the Civil War, so it was the invention of a Southerner, Cyrus McCormick, that made inevitable the ending of that war in favor of the North.

McCormick was born in Rockbridge County, Virginia, on a farm about eighteen miles from Staunton. He was a child of that pioneering Scotch-Irish race which contributed so greatly to the settlement of this region and which afterward

made such inestimable additions to American citizenship. The country in which he grew up was rough and, so far as the conventionalities go, uncivilized; the family homestead was little more than a log cabin; and existence meant a continual struggle with a not particularly fruitful soil. The most remarkable figure in the McCormick home circle, and the one whose every-day life exerted the greatest influence on the boy, was his father. The older McCormick had one obsessing idea that made him the favorite butt of the local humorists. He believed that the labor spent in reaping grain was a useless expenditure of human effort and that machinery might be made to do the work. Other men, in this country and in Europe, had nourished similar notions. Several Englishmen had invented reaping machines, all of which had had only a single defect — they would not reap. An ingenious English actor had developed a contrivance which would cut imitation wheat on the stage, but no one had developed a machine that would work satisfactorily in real life. Robert McCormick spent the larger part of his days and nights tinkering at a practical machine. He finally produced a horrific contrivance, made up of whirling sickles, knives, and revolving rods, pushed from behind by two

horses; when he tried this upon a grain-field, however, it made a humiliating failure.

Evidently Robert McCormick had ambitions far beyond his powers; yet without his absurd experiments the development of American agriculture might have waited many years. They became the favorite topics of conversation in the evening gatherings that took place about the family log fire. Robert McCormick had several sons, and one manifested a particular interest in his repeated failures. From the time he was seven years old Cyrus Hall McCormick became his father's closest companion. Others might ridicule and revile, but this chubby, bright-eyed, intelligent little boy was always the keenest listener, the one comfort which the father had against his jeering neighbors. He also became his father's constant associate in his rough workshop. Soon, however, the older man noticed a change in their relations. The boy was becoming the teacher, and the father was taught. By the time Cyrus was eighteen, indeed, he had advanced so far beyond his father that the latter had become merely a proud observer. Young McCormick threw into the discard all his father's ideas and struck out on entirely new lines. By the time he had reached his twenty-second birthday he

had constructed a machine which, in all its essential details, is the one which we have today. He had introduced seven principles, all of which are an indispensable part of every reaper constructed now. One afternoon he drove his unlovely contraption upon his father's farm, with no witnesses except his own family. This group now witnessed the first successful attempt ever made to reap with machinery. A few days later young McCormick gave a public exhibition at Steele's Tavern, cutting six acres of oats in an afternoon. The popular ridicule soon changed into acclaim; the new invention was exhibited in a public square and Cyrus McCormick became a local celebrity. Perhaps the words that pleased him most, however, were those spoken by his father. "I am proud," said the old man, "to have a son who can do what I failed to do."

This McCormick reaper dates from 1831; but it represented merely the beginnings of the modern machine. It performed only a single function; it simply cut the crop. When its sliding blade had performed this task, the grain fell back upon a platform, and a farm hand, walking alongside, raked this off upon the ground. A number of human harvesters followed, picked up the bundles, and tied a

few strips of grain around them, making the sheaf. The work was exceedingly wearying and particularly hard upon the women who were frequently impressed into service as farm-hands. About 1858 two farmers named Marsh, who lived near De Kalb, Illinois, solved this prohlem. They attached to their McCormick reaper a moving platform upon which the cut grain was deposited. A footboard was fixed to the machine upon which two men stood. As the grain came upon this moving platform these men seized it, bound it into sheaves, and threw it upon the field. Simple as this procedure seemed it really worked a revolution in agriculture; for the first time since the pronouncement of the primal curse, the farmer abandoned his hunchback attitude and did his work standing erect. Yet this device also had its disqualifications, the chief one being that it converted the human sheaf-binder into a sweat-shop worker. It was necessary to bind the grain as rapidly as the platform brought it up; the worker was therefore kept in constant motion; and the consequences were frequently distressing and nerve racking. Yet this "Marsh Harvester" remained the great favorite with farmers from about 1860 to 1874.

All this time, however, there was a growing

feeling that even the Marsh harvester did not represent the final solution of the problem; the air was full of talk and prophecies about self-binders, something that would take the loose wheat from the platform and transform it into sheaves. Hundreds of attempts failed until, in 1874, Charles B. Withington of Janesville, Wisconsin, brought to McCormick a mechanism composed of two steel arms which seized the grain, twisted a wire around it, cut the wire, and tossed the completed sheaf to the earth. In actual practice this contrivance worked with the utmost precision. Finally American farmers had a machine that cut the grain, raked it up, and bound it into sheaves ready for the mill. Human labor had apparently lost its usefulness; a solitary man or woman, perched upon a seat and driving a pair of horses, now performed all these operations of husbandry.

By this time, scores of manufacturers had entered the field in opposition to McCormick, but his acquisition of Withington's invention had apparently made his position secure. Indeed, for the next ten years he had everything his own way. Then suddenly an ex-keeper of a dry-goods store in Maine crossed his path. This was William Deering, a character quite as energetic, forceful, and

pugnacious as was McCormick himself. Though McCormick had made and sold thousands of his self-binders, farmers were already showing signs of discontent. The wire proved a continual annoyance. It mingled with the straw and killed the cattle — at least so the farmers complained; it cut their hands and even found its way, with disastrous results, into the flour mills. Deering now appeared as the owner of a startling invention by John F. Appleby. This did all that the Withington machine did and did it better and quicker; and it had the great advantage that it bound with twine instead of wire. The new machine immediately swept aside all competitors; McCormick, to save his reaper from disaster, presently perfected a twine binder of his own. The appearance of Appleby's improvement in 1884 completes the cycle of the McCormick reaper on its mechanical side The harvesting machine of fifty nations today is the one to which Appleby put the final touches in 1884. Since then nothing of any great importance has been added.

This outline of invention, however, comprises only part of the story. The development of the reaper business presents a narrative quite as adventurous as that of the reaper itself. Cyrus

McCORMICK'S FIRST REAPING MACHINE

Wood engraving in *Mechanic's Magazine and Register of Inventions and Improvements*, October, 1834.

CYRUS H. McCORMICK

Daguerreotype taken about 1839.

McCormick was not only a great inventor; he was also a great business man. So great was his ability in this direction, indeed, that there has been a tendency to discredit his achievements as a creative genius and to attribute his success to his talents as an organizer and driver of industry. "I may make a million dollars from this reaper," said McCormick, in the full tide of enthusiasm over his invention; and these words indicate an indispensable part of his program. He had no miserly instinct but he had one overpowering ambition. It was McCormick's conviction, almost religious in its fervor, that the harvester business of the world belonged to him. As already indicated, plenty of other hardy spirits, many of them almost as commanding personalities as himself, disputed the empire. Not far from 12,000 patents on harvesting machines were granted in this country in the fifty years following McCormick's invention, and more than two hundred companies were formed to compete for the market. McCormick always regarded these competitors as highwaymen who had invaded a field which had been almost divinely set apart for himself. A man of covenanting antecedents, heroic in his physical proportions, with a massive, Jove-like head and beard, tirelessly devoted to his work,

watching every detail with a microscopic eye, marshaling a huge force of workers who were as possessed by this one overruling idea as was McCormick himself, he certainly presented an almost unassailable battlefront to his antagonists.

The competition that raged between McCormick and the makers of rival machines was probably the fiercest that has prevailed in any American industry. For marketing his machine McCormick developed a system almost as ingenious as the machine itself. The popularization of so ungainly and expensive a contrivance as the harvester proved a slow and difficult task. McCormick at first attempted to build his product on his Virginia farm and for many years it was known as the Virginia Reaper. Nearly ten years passed, however, before he sold his first machine. The farmer first refused to take it seriously. "It's a great invention," he would say, "but I'm running a farm, not a circus." About 1847 McCormick decided that the Western prairies offered the finest field for its activities, and established his factory at Chicago, then an ugly little town on the borders of a swamp. This selection proved to be a stroke of genius, for it placed the harvesting factory right at the door of its largest market.

The price of the harvester, however, seemed an insurmountable obstacle to its extensive use. The early settlers of the Western plains had little more than their brawny hands as capital, and the homestead law furnished them their land practically free. In the eyes of a large-seeing pioneer like McCormick this was capital enough. He determined that his reaper should develop this extensive domain, and that the crops themselves should pay the cost. Selling expensive articles on the installment plan now seems a commonplace of business, but in those days it was practically unknown. McCormick was the first to see its possibilities. He established an agent, usually the general storekeeper, in every agricultural center. Any farmer who had a modicum of cash and who bore a reputation for thrift and honesty could purchase a reaper. In payment he gave a series of notes, so timed that they fell due at the end of harvesting seasons. Thus, as the money came in from successive harvests, the pioneer paid off the notes, taking two, three, or four years in the process. In the sixties and seventies immigrants from the Eastern States and from Europe poured into the Mississippi Valley by the hundreds of thousands. Almost the first person who greeted

the astonished Dane, German, or Swede was an agent of the harvester company, offering to let him have one of these strange machines on these terms. Thus the harvester, under McCormick's comprehensive selling plans, did as much as the homestead act in opening up this great farming region.

McCormick covered the whole agricultural United States with these agents. In this his numerous competitors followed suit, and the liveliest times ensued. From that day to this the agents of harvesting implements have lent much animation and color to rural life in this country. Half a dozen men were usually tugging away at one farmer at the same time. The mere fact that the farmer had closed a contract did not end his troubles, for "busting up competitors' sales" was part of the agent's business. The situation frequently reached a point where there was only one way to settle rival claims and that was by a field contest. At a stated time two or three or four rival harvesters would suddenly appear on the farmer's soil, each prepared to show, by actual test, its superiority over the enemy. Farmers and idlers for miles around would gather to witness the Homeric struggle. At a given signal the small army of machines would spring savagely at a field

of wheat. The one that could cut the allotted area in the shortest time was regarded as the winner. The harvester would rush on all kinds of fields, flat and hilly, dry and wet, and would cut all kinds of crops, and even stubble. All manner of tests were devised to prove one machine stronger than its rival; a favorite idea was to chain two back to back, and have them pulled apart by frantic careering horses; the one that suffered the fewest breakdowns would be generally acclaimed from town to town. Sometimes these field tests were the most exciting and spectacular events at country fairs.

Thus the harvesting machine "pushed the frontier westward at the rate of thirty miles a year," according to William H. Seward. It made American and Canadian agriculture the most efficient in the world. The German brags that his agriculture is superior to American, quoting as proof the more bushels of wheat or potatoes he grows to an acre. But the comparison is fallacious. The real test of efficiency is, not the crops that are grown per acre, but the crops that are grown per man employed. German efficiency gets its results by impressing women as cultivators — depressing bent figures that are in themselves a sufficient criticism upon any civilization. America gets its results

by using a minimum of human labor and letting machinery do the work. Thus America's methods are superior not only from the standpoint of economics but of social progress. All nations, including Germany, use our machinery, but none to the extent that prevails on the North American Continent.

Perhaps McCormick's greatest achievement is that his machine has banished famine wherever it is extensively used, at least in peace times. Before the reaper appeared existence, even in the United States, was primarily a primitive struggle for bread. The greatest service of the harvester has been that it has freed the world — unless it is a world distracted by disintegrating war — from a constant anxiety concerning its food supply. The hundreds of thousands of binders, active in the fields of every country, have made it certain that humankind shall not want for its daily bread. When McCormick exhibited his harvester at the London Exposition of 1851, the *London Times* ridiculed it as "a cross between an Astley chariot, a wheel barrow, and a flying machine." Yet this same grotesque object, widely used in Canada, Argentina, Australia, South Africa, and India, becomes an engine that really holds the British Empire together.

For the forty years succeeding the Civil War the manufacture of harvesting machinery was a business in which many engaged, but in which few survived. The wildest competition ruthlessly destroyed all but half a dozen powerful firms. Cyrus McCormick died in 1884, but his sons proved worthy successors; the McCormick factory still headed the list, manufacturing, in 1900, one-third of all the self-binders used in the world. The William Deering Company came next and then D. M. Osborne, J. J. Glessner, and W. H. Jones, established factories that made existence exceedingly uncomfortable for the pioneers. Whatever one may think of the motives which caused so many combinations in the early years of the twentieth century, there is no question that irresistible economic forces compelled these great harvester companies to get together. Quick profits in the shape of watered stock had nothing to do with the formation of the International Harvester Company. All the men who controlled these enterprises were individualists, with a natural loathing for trusts, combinations, and pools. They wished for nothing better than to continue fighting the Spartan battle that had made existence such an exciting pastime for more than half a century. But the simple fact

was that these several concerns were destroying one another; it was a question of joining hands, ending the competition that was eating so deeply into their financial resources, or reducing the whole business to chaos. When Mr. George W. Perkins, of J. P. Morgan and Company, first attempted to combine these great companies, the antagonisms which had been accumulated in many years of warfare constantly threatened to defeat his end. He early discovered that the only way to bring these men together was to keep them apart. The usual way of creating such combinations is to collect the representative leaders, place them around a table, and persuade them to talk the thing over. Such an amicable situation, however, was impossible in the present instance. Even when the four big men — McCormick, Deering, Glessner, and Jones — were finally brought for the final treaty of peace to J. P. Morgan's office, Mr. Perkins had to station them in four separate rooms and flit from one to another arranging terms. Had these four men been brought face to face, the Harvester Company would probably never have been formed.

Having once signed their names, however, these once antagonistic interests had little difficulty in forming a strong combination. The company thus

brought together manufactured 85 per cent of all the farm machinery used in this country. It owned its own coal-fields and iron mines and its own forests, and it produces most of the implements used by 10,000,000 farmers. In 1847 Cyrus McCormick made 100 reapers and sold them for $10,000; by 1902 the annual production of the corporation amounted to hundreds of thousands of harvesters — besides an almost endless assortment of other agricultural tools, ploughs, drills, rakes, gasoline engines, tractors, threshers, cream separators, and the like — and the sales had grown to about $75,000,000. This is merely the financial measure of progress; the genuine achievements of McCormick's invention are millions of acres of productive land and a farming population which is without parallel elsewhere for its prosperity, intelligence, manfulness, and general contentment.

CHAPTER VII

THE DEMOCRATIZATION OF THE AUTOMOBILE

In many manufacturing lines, American genius for organization and large scale production has developed mammoth industries. In nearly all the tendency to combination and concentration has exercised a predominating influence. In the early years of the twentieth century the public realized, for the first time, that one corporation, the American Sugar Refining Company, controlled ninety-eight per cent of the business of refining sugar. Six large interests — Armour, Swift, Morris, the National Packing Company, Cudahy, and Schwarzschild and Sulzberger — had so concentrated the packing business that, by 1905, they slaughtered practically all the cattle shipped to Western centers and furnished most of the beef consumed in the large cities east of Pittsburgh. The "Tobacco Trust" had largely monopolized both the wholesale and retail trade in this article of luxury and had also made

extensive inroads into the English market. The textile industry had not only transformed great centers of New England into an American Lancashire, but the Southern States, recovering from the demoralization of the Civil War, had begun to spin their own cotton and to send the finished product to all parts of the world. American shoe manufacturers had developed their art to a point where "American shoes" had acquired a distinctive standing in practically every European country.

It is hardly necessary to describe in detail each of these industries. In their broad outlines they merely repeat the story of steel, of oil, of agricultural machinery; they are the product of the same methods, the same initiative. There is one branch of American manufacture, however, that merits more detailed attention. If we scan the manufacturing statistics of 1917, one amazing fact stares us in the face. There are only three American industries whose product has attained the billion mark; one of these is steel, the other food products, while the third is an industry that was practically unknown in the United States fifteen years ago. Superlatives come naturally to mind in discussing American progress, but hardly any extravagant phrases could do justice to the development of

American automobiles. In 1899 the United States produced 3700 motor vehicles; in 1916 we made 1,500,000. The man who now makes a personal profit of not far from $50,000,000 a year in this industry was a puttering mechanic when the twentieth century came in. If we capitalized Henry Ford's income, he is probably a richer man than Rockefeller; yet, as recently as 1905 his possessions consisted of a little shed of a factory which employed a dozen workmen. Dazzling as is this personal success, its really important aspects are the things for which it stands. The American automobile has had its wild-cat days; for the larger part, however, its leaders have paid little attention to Wall Street, but have limited their activities exclusively to manufacturing. Moreover, the automobile illustrates more completely than any other industry the technical qualities that so largely explain our industrial progress. Above all, American manufacturing has developed three characteristics. These are quantity production, standardization, and the use of labor-saving machinery. It is because Ford and other manufacturers adapted these principles to making the automobile that the American motor industry has reached such gigantic proportions.

A few years ago an English manufacturer, seeking the explanation of America's ability to produce an excellent car so cheaply, made an interesting experiment. He obtained three American automobiles, all of the same "standardized" make, and gave them a long and racking tour over English highways. Workmen then took apart the three cars and threw the disjointed remains into a promiscuous heap. Every bolt, bar, gas tank, motor, wheel, and tire was taken from its accustomed place and piled up, a hideous mass of rubbish. Workmen then painstakingly put together three cars from these disordered elements. Three chauffeurs jumped on these cars, and they immediately started down the road and made a long journey just as acceptably as before. The Englishman had learned the secret of American success with automobiles. The one word "standardization" explained the mystery.

Yet when, a few years before, the English referred to the American automobile as a "glorified perambulator," the characterization was not unjust. This new method of transportation was slow in finding favor on our side of the Atlantic. America was sentimentally and practically devoted to the horse as the motive power for vehicles; and the

fact that we had so few good roads also worked against the introduction of the automobile. Yet here, as in Europe, the mechanically propelled wagon made its appearance in early times. This vehicle, like the bicycle, is not essentially a modern invention; the reason any one can manufacture it is that practically all the basic ideas antedate 1840. Indeed, the automobile is really older than the railroad. In the twenties and thirties, steam stage coaches made regular trips between certain cities in England and occasionally a much resounding power-driven carriage would come careering through New York and Philadelphia, scaring all the horses and precipitating the intervention of the authorities. The hardy spirits who devised these engines, all of whose names are recorded in the encyclopedias, deservedly rank as the "fathers" of the automobile. The responsibility as the actual "inventor" can probably be no more definitely placed. However, had it not been for two developments, neither of them immediately related to the motor car, we should never have had this efficient method of transportation. The real "fathers" of the automobile are Gottlieb Daimler, the German who made the first successful gasoline engine, and Charles Goodyear, the American who discovered

the secret of vulcanized rubber. Without this engine to form the motive power and the pneumatic tire to give it four air cushions to run on, the automobile would never have progressed beyond the steam carriage stage. It is true that Charles Baldwin Selden, of Rochester, has been pictured as the "inventor of the modern automobile" because, as long ago as 1879, he applied for a patent on the idea of using a gasoline engine as motive power, securing this basic patent in 1895, but this, it must be admitted, forms a flimsy basis for such a pretentious claim.

The French apparently led all nations in the manufacture of motor vehicles, and in the early nineties their products began to make occasional appearances on American roads. The type of American who owned this imported machine was the same that owned steam yachts and a box at the opera. Hardly any new development has aroused greater hostility. It not only frightened horses, and so disturbed the popular traffic of the time, but its speed, its glamour, its arrogance, and the haughty behavior of its proprietor, had apparently transformed it into a new badge of social cleavage. It thus immediately took its place as a new gewgaw of the rich; that it had any other purpose to

serve had occurred to few people. Yet the French and English machines created an entirely different reaction in the mind of an imaginative mechanic in Detroit. Probably American annals contain no finer story than that of this simple American workman. Yet from the beginning it seemed inevitable that Henry Ford should play this appointed part in the world. Born in Michigan in 1863, the son of an English farmer who had emigrated to Michigan and a Dutch mother, Ford had always demonstrated an interest in things far removed from his farm. Only mechanical devices interested him. He liked getting in the crops, because McCormick harvesters did most of the work; it was only the machinery of the dairy that held him enthralled. He developed destructive tendencies as a boy; he had to take everything to pieces. He horrified a rich playmate by resolving his new watch into its component parts — and promptly quieted him by putting it together again. "Every clock in the house shuddered when it saw me coming," he recently said. He constructed a small working forge in his school-yard, and built a small steam engine that could make ten miles an hour. He spent his winter evenings reading mechanical and scientific journals; he cared little for

general literature, but machinery in any form was almost a pathological obsession. Some boys run away from the farm to join the circus or to go to sea; Henry Ford at the age of sixteen ran away to get a job in a machine shop. Here one anomaly immediately impressed him. No two machines were made exactly alike; each was regarded as a separate job. With his savings from his weekly wage of $2.50, young Ford purchased a three dollar watch, and immediately dissected it. If several thousand of these watches could be made, each one exactly alike, they would cost only thirty-seven cents a piece. "Then," said Ford to himself, "everybody could have one." He had fairly elaborated his plans to start a factory on this basis when his father's illness called him back to the farm.

This was about 1880; Ford's next conspicuous appearance in Detroit was about 1892. This appearance was not only conspicuous; it was exceedingly noisy. Detroit now knew him as the pilot of a queer affair that whirled and lurched through her thoroughfares, making as much disturbance as a freight train. In reading his technical journals Ford had met many descriptions of horseless carriages; the consequence was that he had again broken away from the farm, taken a job

at $45 a month in a Detroit machine shop, and devoted his evenings to the production of a gasoline engine. His young wife was exceedingly concerned about his health; the neighbors' snap judgment was that he was insane. Only two other Americans, Charles B. Duryea and Ellwood Haynes, were attempting to construct an automobile at that time. Long before Ford was ready with his machine, others had begun to appear. Duryea turned out his first one in 1892; and foreign makes began to appear in considerable numbers. But the Detroit mechanic had a more comprehensive inspiration. He was not working to make one of the finely upholstered and beautifully painted vehicles that came from overseas. "Anything that isn't good for everybody is no good at all," he said. Precisely as it was Vail's ambition to make every American a user of the telephone and McCormick's to make every farmer a user of his harvester, so it was Ford's determination that every family should have an automobile. He was apparently the only man in those times who saw that this new machine was not primarily a luxury but a convenience. Yet all manufacturers, here and in Europe, laughed at his idea. Why not give every poor man a Fifth Avenue house? Frenchmen and Englishmen

scouted the idea that any one could make a cheap automobile. Its machinery was particularly refined and called for the highest grade of steel; the clever Americans might use their labor-saving devices on many products, but only skillful hand work could turn out a motor car. European manufacturers regarded each car as a separate problem; they individualized its manufacture almost as scrupulously as a painter paints his portrait or a poet writes his poem. The result was that only a man with several thousand dollars could purchase one. But Henry Ford — and afterward other American makers — had quite a different conception.

Henry Ford's earliest banker was the proprietor of a quick-lunch wagon at which the inventor used to eat his midnight meal after his hard evening's work in the shed. "Coffee Jim," to whom Ford confided his hopes and aspirations on these occasions, was the only man with available cash who had any faith in his ideas. Capital in more substantial form, however, came in about 1902. With money advanced by "Coffee Jim," Ford had built a machine which he entered in the Grosse Point races that year. It was a hideous-looking affair, but it ran like the wind and outdistanced all competitors. From that day Ford's career has been

an uninterrupted triumph. But he rejected the earliest offers of capital because the millionaires would not agree to his terms. They were looking for high prices and quick profits, while Ford's plans were for low prices, large sales, and use of profits to extend the business and reduce the cost of his machine. Henry Ford's greatness as a manufacturer consists in the tenacity with which he has clung to this conception. Contrary to general belief in the automobile industry he maintained that a high sale price was not necessary for large profits; indeed he declared that the lower the price, the larger the net earnings would be. Nor did he believe that low wages meant prosperity. The most efficient labor, no matter what the nominal cost might be, was the most economical. The secret of success was the rapid production of a serviceable article in large quantities. When Ford first talked of turning out 10,000 automobiles a year, his associates asked him where he was going to sell them. Ford's answer was that that was no problem at all; the machines would sell themselves. He called attention to the fact that there were millions of people in this country whose incomes exceeded $1800 a year; all in that class would become prospective purchasers of a low-priced auto-

mobile. There were 6,000,000 farmers; what more receptive market could one ask? His only problem was the technical one — how to produce his machine in sufficient quantities.

The bicycle business in this country had passed through a similar experience. When first placed on the market bicycles were expensive; it took $100 or $150 to buy one. In a few years, however, an excellent machine was selling for $25 or $30. What explained this drop in price? The answer is that the manufacturers learned to standardize their product. Bicycle factories became not so much places where the articles were manufactured as assembling rooms for putting them together. The several parts were made in different places, each establishment specializing in a particular part; they were then shipped to centers where they were transformed into completed machines. The result was that the United States, despite the high wages paid here, led the world in bicycle making and flooded all countries with this utilitarian article. Our great locomotive factories had developed on similar lines. Europeans had always marveled that Americans could build these costly articles so cheaply that they could undersell European makers. When they obtained a glimpse of an

American locomotive factory, the reason became plain. In Europe each locomotive was a separate problem; no two, even in the same shop, were exactly alike. But here locomotives are built in parts, all duplicates of one another; the parts are then sent by machinery to assembling rooms and rapidly put together. American harvesting machines are built in the same way; whenever a farmer loses a part, he can go to the country store and buy its duplicate, for the parts of the same machine do not vary to the thousandth of an inch. The same principle applies to hundreds of other articles.

Thus Henry Ford did not invent standardization; he merely applied this great American idea to a product to which, because of the delicate labor required, it seemed at first unadapted. He soon found that it was cheaper to ship the parts of ten cars to a central point than to ship ten completed cars. There would therefore be large savings in making his parts in particular factories and shipping them to assembling establishments. In this way the completed cars would always be near their markets. Large production would mean that he could purchase his raw materials at very low prices; high wages meant that he could get the efficient

labor which was demanded by his rapid fire method of campaign. It was necessary to plan the making of every part to the minutest detail, to have each part machined to its exact size, and to have every screw, bolt, and bar precisely interchangeable. About the year 1907 the Ford factory was systematized on this basis. In that twelvemonth it produced 10,000 machines, each one the absolute counterpart of the other 9999. American manufacturers until then had been content with a few hundred a year! From that date the Ford production has rapidly increased; until, in 1916, there were nearly 4,000,000 automobiles in the United States — more than in all the rest of the world put together — of which one-sixth were the output of the Ford factories. Many other American manufacturers followed the Ford plan, with the result that American automobiles are duplicating the story of American bicycles; because of their cheapness and serviceability, they are rapidly dominating the markets of the world. In the Great War American machines have surpassed all in the work done under particularly exacting circumstances.

A glimpse of a Ford assembling room — and we can see the same process in other American factories — makes clear the reasons for this success.

In these rooms no fitting is done; the fragments of automobiles come in automatically and are simply bolted together. First of all the units are assembled in their several departments. The rear axles, the front axles, the frames, the radiators, and the motors are all put together with the same precision and exactness that marks the operation of the completed car. Thus the wheels come from one part of the factory and are rolled on an inclined plane to a particular spot. The tires are propelled by some mysterious force to the same spot; as the two elements coincide, workmen quickly put them together. In a long room the bodies are slowly advanced on moving platforms at the rate of about a foot per minute. At the side stand groups of men, each prepared to do his bit, their materials being delivered at convenient points by chutes. As the tops pass by these men quickly bolt them into place, and the completed body is sent to a place where it awaits the chassis. This important section, comprising all the machinery, starts at one end of a moving platform as a front and rear axle bolted together with the frame. As this slowly advances, it passes under a bridge containing a gasoline tank, which is quickly adjusted. Farther on the motor is swung over by a small hoist

and lowered into position on the frame. Presently the dash slides down and is placed in position behind the motor. As the rapidly accumulating mechanism passes on, different workmen adjust the mufflers, exhaust pipes, the radiator, and the wheels which, as already indicated, arrive on the scene completely tired. Then a workman seats himself on the gasoline tank, which contains a small quantity of its indispensable fuel, starts the engine, and the thing moves out the door under its own power. It stops for a moment outside; the completed body drops down from the second floor, and a few bolts quickly put it securely in place. The workman drives the now finished Ford to a loading platform, it is stored away in a box car, and is started on its way to market. At the present time about 2000 cars are daily turned out in this fashion. The nation demands them at a more rapid rate than they can be made.

Herein we have what is probably America's greatest manufacturing exploit. And this democratization of the automobile comprises more than the acme of efficiency in the manufacturing art. The career of Henry Ford has a symbolic significance as well. It may be taken as signalizing the new ideals that have gained the upper hand in

American industry. We began this review of American business with Cornelius Vanderbilt as the typical figure. It is a happy augury that it closes with Henry Ford in the foreground. Vanderbilt, valuable as were many of his achievements, represented that spirit of egotism that was rampant for the larger part of the fifty years following the war. He was always seeking his own advantage, and he never regarded the public interest as anything worth a moment's consideration. With Ford, however, the spirit of service has been the predominating motive. His earnings have been immeasurably greater than Vanderbilt's; his income for two years amounts to nearly Vanderbilt's total fortune at his death; but the piling up of riches has been by no means his exclusive purpose. He has recognized that his workmen are his partners and has liberally shared with them his increasing profits. His money is not the product of speculation; Ford is a stranger to Wall Street and has built his business independently of the great banking interest. He has enjoyed no monopoly, as have the Rockefellers; there are more than three hundred makers of automobiles in the United States alone. He has spurned all solicitations to join combinations. Far from asking tariff favors

he has entered European markets and undersold English, French, and German makers on their own ground. Instead of taking advantage of a great public demand to increase his prices, Ford has continuously lowered them. Though his idealism may have led him into an occasional personal absurdity, as a business man he may be taken as the full flower of American manufacturing genius. Possibly America, as a consequence of universal war, is advancing to a higher state of industrial organization; but an economic system is not entirely evil that produces such an industry as that which has made the automobile the servant of millions of Americans.

BIBLIOGRAPHICAL NOTE

THE materials are abundant for the history of American industry in the last fifty years. They exist largely in the form of official documents. Any one ambitious of studying this subject in great detail should consult, first of all, the catalogs issued by that very valuable institution, the Government Printing Office. The Bureau of Corporations has published elaborate reports on such industries as petroleum (Standard Oil Company), beef, tobacco, steel, and harvesting machinery, which are indispensable in studying these great basic enterprises. The American habit of legislative investigation and trust-fighting in the courts, whatever its public value may have been, has at least had the result of piling up mountains of material for the historian of American industry. For one single corporation, the Standard Oil Company, a great library of such literature exists. The nearly twenty volumes of testimony, exhibits, and briefs assembled in the course of the Federal suit which led to its dissolution is the ultimate source of material on America's greatest trust. As most of our other great corporations — the Steel Trust, the Harvester Company, the Tobacco Company, and the like — have passed through similar ordeals, all the information the student could ask concerning them exists in the same form. The archives of such bodies as the Interstate Commerce

Commission and Public Utility Commissions of the States are also bulging with documentary evidence. Thus all the material contained in this volume — and much more — concerning the New York traction situation will be found in the investigation conducted in 1907 by the Public Service Commission of New York, Second District.

American business has also developed a great talent for publicity. Nearly all our big corporations have assembled much material about their own history, all of which is public property. Thus the American Telephone and Telegraph Company can furnish detailed information on every phase of its business and history. Indeed, one's respect for the achievements of American industry is increased by the praiseworthy curiosity which it displays about its own past and the readiness with which it makes such material accessible to the public. Despite the abundance of data, there is not a great amount of popular writing on these subjects that has much fascination as literature or much value as history. The only book that is really important is Miss Ida M. Tarbell's *History of the Standard Oil Company*, 2 vols. (new edition 1911). Of other popular volumes the present writer has found most useful Herbert N. Casson's *Romance of Steel* (1907), *History of the Telephone* (1910), and *Cyrus Hall McCormick: His Life and Work* (1909); J. H. Bridge's *Inside History of the Carnegie Steel Company* (1903); *Henry Ford's Own Story* as told to Rose Wildes Lane (1917).

For Chapter V, the author has drawn from articles contributed by him in 1907–8 to *McClure's Magazine* on *Great American Fortunes and their Making;* and for Chapter IV, from an article contributed to the same magazine in 1914, on *Telephones for the Millions.*

INDEX

Acme Oil Company, 37
Agricultural machinery, 149–69
Alabama, steel in, 77
American Bell Telephone Company, 114–15; *see also* American Telephone and Telegraph Company, Bell Company
American Bridge Company, 81
American Speaking Telephone Company, 111
American Steel and Wire Company, 79, 81
American Sugar Refining Company, 170
American Telephone and Telegraph Company, upright business methods, 92–93; takes over American Bell Company, 115; growth of, 115; bibliography, 190; *see also* American Bell Telephone Company, Bell Company
American Transfer Company, 38
Andrews, Samuel, associate of Rockefeller, 33, 35
Appleby, J. F., inventor of twine binder, 154, 160
Archbold, J. D., President of Acme Oil Company, 37; associate of Rockefeller, 42
Armour and Company, 170
Aspinwall, William, 12
Astor, W. B., 10
Automobiles, 171 *et seq.*

Barnum, P. T., 12
Barrett, J. P., invents telephone cable, 103
Beach, M. Y., *Wealthy Men of New York*, 10, 11
Bell, A. G., inventor of telephone, 88; life, 93–94; works on "harmonic telegraph," 94–97; invention of telephone, 97–98; lectures to finance scheme, 106; returns to teaching deaf-mutes, 113; later activities, 113
Bell, Mrs. A. G., 92
Bell Company, Vail as General Manager, 107–11; trouble with Western Union, 111–13; buys Western Union Telephone System, 113; *see also* American Bell Telephone Company, American Telephone and Telegraph Company
Bennett, Arnold, quoted, 86–87
Berkman attacks Frick, 72
Berliner, Emile, invents a telephone transmitter, 101
Bessemer, Henry, developed steel manufacture, 61–62
Birmingham (Ala.), steel manufacture in, 77–78
Bishop, Japhet, 12
Bismarck, Prince, quoted, 153–154
Bissell, G. H., interest in refining of petroleum, 28–29
Blake, Francis, invents a telephone transmitter, 101
Boston, telephones in, 89
Brewster, Benjamin, associate of Rockefeller, 41
Broadway railroad franchise, 136–39

Brooklyn Rapid Transit, 146

Calhoun, Patrick, 124
Carnegie, Andrew, a maker of American Steel Age, 59; quoted, 60; genius of, 66–69; retires from business life, 80; sells interests to Morgan, 84
Carnegie Steel Company, 76, 79
Carty, J. J., improves telephone, 93, 102–03
Chicago, steel production in, 77; telephones in, 89; street railway corruption, 125–26, 142–143, 144–45; McCormick establishes factory at, 162
Choate, J. H., 130
City government, corruption of, 123–24; *see also* Chicago, New York City
Civil War, effect on industrial development, 13 *et seq.*
Cleveland, Grover, 131
Cleveland, oil refining center, 36; steel production in, 77
Clifford, George, conducts case for Western Union against Bell Company, 112
Coal, importation in 1865, 4; deposits in U. S., 4–5
Coggeswell, W. L., 12
Coleman, Pittsburgh steel magnate, 66
Colorado Fuel and Iron Company, 57, 77
Columbia Conduit Company, 39
Competition in 1865, 7–9
Conkling, Roscoe, counsel for legislative investigation of Broadway franchise, 136, 138
Conneaut (O.), terminus for ore shipping, 75; Carnegie builds steel plant at, 82
Connellsville coal, 71–72
Cooper, Peter, 12
Copper importation in 1865, 4
Cudahy Packing Company, 170

Daimler, Gottlieb, inventor of gasoline engine, 174
Deering, William, 159–60, 168
Deering Company, William, 167
Dolan helps combine public utilities, 121
Doolittle, T. B., invents hard-drawn copper wire, 102
Drake, E. L., drills first oil wells, 29–30
Duryea, C. B., constructs automobile, 178

Edison, T. A., devises telephone transmitter, 101, 112; invents incandescent light, 121
Elkins, W. L., helps combine public utilities, 121; in Philadelphia, 123, 129, 134; connection with Broadway franchise, 138; in Chicago, 142, 143, 145
Emery, Lewis, Jr., builds pipe lines, 55
Empire Transportation Company, 39
Everett, P. M., discovers iron in Minn., 63–64

Federal Steel Company, 81
Flagler, H. M., associate of Rockefeller, 35, 42
Flower, R. P., Governor of N. Y., 123–24
Ford, Henry, wealth, 172; life and achievements, 176 *et seq.*
Forests, beginning of exploitation, 3
Frick, H. C., a maker of American Steel Age, 59, 66; personal characteristics, 70–71; "coke king" of Connellsville, 71–72; receipts in 1900, 80
Fullgraff, "boodle alderman" in New York street railway corruption, 137

Gates, J. W., introduces wire fencing, 78–79; discusses steel situation with Morgan, 84

Glessner, J. J., establishes factory for self-binders, 167, 168
Goodyear, Charles, discovers secret of vulcanized rubber, 174–75
Gould, G. J., 83
Gray, Elisha, perfects "harmonic telegraph," 95; invents telephone, 96–97
Gulf Refining Company, 56

Haggerty, John, 12
Hanna, Mark, 123
Harmony, Peter, 12
Haupt, General Herman, builds pipe line for Tidewater Company, 39
Haynes, Ellwood, constructs automobile, 178
Homestead strikes, 72, 73
Hostetter builds pipe line for Columbia Conduit Company, 39
Hubbard, G. G., interest in Bell's experiments, 94; refuses at first to finance telephone, 97; places Vail as General Manager of Bell Company, 106–07; later life, 113
Hudson River Railroad, 23, 24
Hummings, Rev. Henry, suggests improvements in telephone, 101

Immigration after Civil War, 14
Industrial combinations, Western Union Telegraph Company, 9; railroads, 9, 23–24; Standard Oil Company, 25, 36, 52–54; United States Steel Corporation, 84–85; International Harvester Company, 153, 167–169; *see also* names of corporations
International Harvester Company, 153, 167–69
Interstate Commerce Act (1887), 48
Iron, in U. S., 5; in Minn., 63–64

Jennings, Oliver, associate of Rockefeller, 41
Johnstown (Pa.), steel production at, 77
Joliet (Ill.), steel production at, 77
Jones, Captain Bill, early maker of steel, 66, 68
Jones, W. H., manufacturer of self-binders, 167, 168

Kansas City, telephones in, 89
Kelly, William, discovers "Bessemer process" of making steel, 61, 62
Kemble, W. H., plays part in public utilities corruption, 125, 138
Kier, S. M., exploits petroleum as medicine, 27–28
Kloman, Pittsburgh steel magnate, 66

Land, beginning of exploitation, 3
Law, George, 12
Lenox, James, 11
London *Times*, comments on invention of telephone, 87; ridicules McCormick harvester, 166
Lorain (O.), steel production in, 77
Los Angeles, telephones in, 89

McCandless, Pittsburgh steel magnate, 66
McCormick, C. H., invents reaper, 149, 150; life and achievement, 154–57; as a business man, 160–64; harvester exhibited at London Exposition (1851), 166; death (1884), 167; growth of business, 169
McCormick, Robert, father of C. H., 155–56
McKay sewing machine, 16
McQuade, A. J., 137

Manufactures, in 1865, 5–7; effect of Civil War on, 16–17; in early 20th century, 171
Marsh, C. W., invents improvement to reaper, 154, 158
Mercer, J. P., City Treasurer in Philadelphia, 127
Mesaba iron ore range, 57
Metropolitan Street Railway Company, 139 *et seq.*
Metropolitan Traction Company, 139, 141 (note)
Minnesota, iron fields of, 63–65
Monopolies, *see* Industrial combinations
Morgan, J. P., 81, 84, 168
Morris and Company, 170
Municipal government, *see* City government

National Packing Company, 170
National Tube Company, 81, 82
New York Central Railroad, under Vanderbilt, 23–24; rebates granted by, 45–48
New York City, telephones in, 88–89; street railways, 119; street railway corruption, 135–147
Northcliffe, Lord, telephone demonstration, 86

Oil, first "oil gusher," 4; "Oil Creek," 26–27; used as medicine, 27–28; Bissell's project, 28–29; Silliman's report, 28; "Drake's folly," 29; rush to oil-fields, 30; commercial importance, 31; in Middle West and West, 56; *see also* Standard Oil Company
Osborne, D. M., manufactures farm machinery, 167

Page, Dr. C. C., article on theory of sound, 96
Pennsylvania, oil in, 26 *et seq.*
Pennsylvania Railroad, rebates granted by, 44–46; monopoly in and out of Pittsburgh, 83
Perkins, G. W., 81, 168
Petroleum, *see* Oil
Philadelphia, telephones in, 89; public utilities, 121 *et seq.*
Phipps, Henry, associate of Carnegie, 59, 66, 69–70; receipts in 1900, 80
Pittsburgh as steel center, 74–75
Public utilities, 119 *et seq.*
Public Utility Commissions, 148
Pupin, M. I., invents "Pupin coil," 93, 103–05
Pure Oil Company, 55, 56

Railroads, of Civil War days, 2; combinations, 9, 23–24; *see also* Vanderbilt
Rebates, to Standard Oil Company, 43–44, 48; to South Improvement Company, 45–46; to Carnegie, 76
Reis, Philip, telephone experiments by, 96
Rockefeller, J. D., 31 *et seq.*
Rogers, H. H., associate of Rockefeller, 42
Rural free delivery, 90
Ryan, T. F., effects combinations of public utilities, 121; in Tammany Hall, 123; buys Chicago railway system, 126; life and character, 132–34; connection with New York street railways, 137, 138

Salt manufacture, 27–28
Sanders, Thomas, patron of Bell, 94, 95; refuses at first to finance telephone. 97; withdraws from telephone company, 113
Schwab, C. M., 80; associate of Carnegie, 59, 66; personal characteristics, 70–71; reorganizes Homestead Works, 72–73; made President of Carnegie Company, 73; to be manager

Schwab, C. M.—*Continued*
at Conneaut, 83; discusses steel situation with Morgan, 83–84
Schwarzschild and Sulzberger, 170
Scott, T. A., President of Pennsylvania Railroad, 44, 49, 66; makes Carnegie private secretary, 67; partner of Carnegie, 76
Scribner, C. E., inventor of multiple switchboard, 93, 103
Selden, C. B., "inventor of the modern automobile," 175
Seward, W. H., quoted, 165
Sharp, Jacob, connection with New York street railway corruption, 135–36
Shinn, Pittsburgh steel magnate, 66
Shipbuilding, 3
Shoe manufacture, 6, 16, 171
Silliman, Benjamin, Jr., report on petroleum analysis, 28
South Improvement Company, 44–47
Sprague, F. J., constructs urban trolley, 121
Standard Oil Company, evolution typical of economic change, 3; of Ohio, in 1877, 25; incorporated (1870), 36; development, 36 *et seq.*; methods of marketing oil, 50–51; organization, 52–53; Standard Oil Trust, 53; of N. J., 53–54; combination dissolved, 54; financial power of, 57; bibliography, 189, 190; *see also* Rockefeller
Steel, increased use of, 58–59; growth of industry in America, 60–61, 75–78; reasons for success in America, 73–74; bibliography, 189, 190; *see also* Carnegie
Stetson, F. L., invents "holding company," 139
Stewart, A. T., 12
Stewart, Pittsburgh steel magnate, 66
Stone, Amasa, associate of Rockefeller, 41
Street railways, *see* Chicago, New York City
Sumner, W. G., 130
Swift and Company, 170

Tammany Hall, 123, 131, 133
Telephone, 86 *et seq.*; bibliography, 190
Texas Refining Company, 56
Thompson, J. E., 66
Tidewater Company, 40
Tilden, S. J., 130
Tobacco Trust, 170–71, 189
Transportation, effect of Civil War on, 15
Trusts, *see* Industrial combinations
Tweed, W. M., 130

United Pipe Line Company, 39
United States, economic conditions in 1865, 1 *et seq.*
United States Steel Corporation, 3, 84–85

Vail, Stephen, 107
Vail, T. N., General Manager of Bell Company, 107 *et seq.*
Vanderbilt, Cornelius, 11, 18–24, 49, 186
Vanderbilt, W. H., quoted, 41–42
Vandervoort, Pittsburgh steel magnate, 66
Van Syckel, Samuel, discovers use of oil pipes, 30

Watson, T. A., associate of Bell, 97, 98, 106, 113–14
Wealth in 1855, distribution of, 10–11; sources of, 11–12
Western Electric Manufacturing Company, 114
Western Union Telegraph Company, 9, 88, 101, 111–14

Western Union Telephone Company, 113
White, Chief Justice E. D., renders Standard Oil decision, 54
Whitney, Eli, 154
Whitney, Stephen, 10–11
Whitney, W. C., helps combine public utilities, 121; in Tammany Hall, 123; buys Chicago railway system, 126; life and activities, 130–32; connection with public utilities corruption, 134, 137, 138, 139, 146–47
Widener, P. A. B., helps combine public utilities, 121; in Philadelphia, 123, 134; personal characteristics and life, 127–129; part in New York street railway corruption, 138; in Chicago, 142, 143, 145
Withington, C. B., inventor of self-binder, 154, 159

Yerkes, C. T., helps combine public utilities, 121; in Chicago, 123, 125–26, 134, 143, 144–145; operations in London, 126
Youngstown (O)., steel production at, 77

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